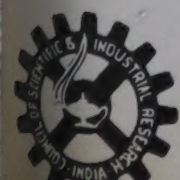


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Food Technology Abstracts



Central Food Technological
Research Institute, Mysore — 570 013
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FOOD TECHNOLOGY ABSTRACTS

Volume 21 No.11

November 1986

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National Information Centre for Food Science and Technology

Central Food Technological Research Institute,

Mysore — 570 013 India

FOOD TECHNOLOGY ABSTRACTS

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Abstracts of papers presented at the 1992 International Conference on Food Technology

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GENERAL

- 2771 HEINZ (S) and LEHNE (H). On the economic valuation of biotechnological processes. *Lebensmittelindustrie*. 33(1); 1986; 5-9 (German)

The author has shown how economic considerations can influence the selection of the direction that is to be taken in biotechnological research. The parameters required for an economic evaluation of a given process are the total investment for a given scale of production, or the capacity/cost problem. One also requires a method that would make it possible to summarize quantitative data in natural terms (i.e. language) and to combine them with certain non-definable criteria to arrive at an overall judgement. KMD

FOOD PROCESSING AND PACKAGING

Processing

- 2772 YOUNGS (RA). Spray drying-encapsulation - today's view. *Food Flavour. Ingrid. Process. Packag.* 8(1); 1986; 31-3

Discusses: Food applications; production of emulsified powders; two stage drying; multi-stage drying-MSD; flavour processing; and future developments. BSN

- 2773 HARPER (JM). Extrusion texturization of foods. *Food Technol.* 40(3); 1986; 70, 72-6

Packaging

- 2774 ANON. Problem and prospect centering around food and food package in Japan in 1986. *Packag. Jpn.* 7(31); 1986; 42-6

Discusses: Food poisoning; microbiological safety; admix of chemical substance into food; food additives, food intake; migrants from food containers; and/or wrapping new type of foods; home electrical appliance for food life; and market liberation policy. BSN

- 2775 TANNERT (U) and SCHULZE FELDMANN (B). Investigations into the migration behaviour of diethylene glycol out of cellophane. *Dtsch. Lebensmittel Rundschau*. 82(3); 1986; 86-8 (German)

The use of diethylene glycol as a moistener in cellophane is permitted under existing legislation. But the new decision of the Federal Bureau of Health relating to the adulteration of wine with diethylene glycol, has led the authors to examine the migration of this compound into the edible portion of sausages packed (or stuffed) in cellophane. The results are reported in this paper. Cellophane manufacturers have now altered their recipes, so as to exclude the use of diethylene glycol. KMD

- 2776 DENTENER (A). What can we expect next in aseptic cartons? *Food Technol. NZ*. 21(1); 1986; 21-4

FOOD ENGINEERING AND EQUIPMENT

- 2777 CASTAIGNE (F) and LACROIX (C). Rapid heat treatment estimation tables

for homogenous products of simple geometrical shapes. *Sci. Aliment.* 6(1); 1986; 119-33

- 2778 RIZVI (SSH), DANIELS (JA), BENADO (AL) and ZOLLWEG (JA). Supercritical fluid extraction: Operating principles and food applications. *Food Technol.* 40(7), 1986, 57-64

The review covers aspects like process concepts, solvent considerations, functional applications, food-processing applications, impediments to commercialization, and further research needed for expanded applications. KAR.

- 2779 KOHLERT (Chr) and REHER (E-O). Processes within the distance between the rollers of a processing machine - Status of knowledge, intensification of the process and application. *Lebensmittelindustrie.* 33(1); 1986; 26-30 (German)

ENERGY IN FOOD PROCESSING

- 2780 MacDONALD (E). Process integration in the food industry. *Food Flavour Ingrid. Process. Packag.* 8(2); 1986; 49-51

FOOD CHEMISTRY AND ANALYSIS

- 2781 ENGLER (J), KATHE (U) and GEORGI (E). A study on the postreactive selenium elimination from solutions remaining after Kjeldahl digestion by means of selenium. *Nahrung.* 30(1); 1986; 25-30 (German)

- 2782 VILLOTA (R) and HAWKES (JG). Food applications and the toxicological and nutritional implications of amorphous silicon dioxide. *CRC Crit. Rev. Food Sci. Nutr.* 23(4); 1986; 289-21

Discusses: Food applications (anticaking agent, volatile retention in spray drying of fruit or vegetable juices, microencapsulation, clarification, excipients and immobilized enzymes, viscosity control, antifoaming or foaming agent, dough modifier); toxicology; and nutrition. BSN

- 2783 NURSTEN (HE) and O'REILLY (R). Coloured compounds formed by the interaction of glycine and xylose. *Food Chem.* 20(1); 1986; 45-60

The products formed were separated by extraction with light petroleum followed by ethyl ether. The 22 main peaks were collected and freed from adjacent peaks and shoulders by HPLC before mass spectrometry. The 17 compounds which gave orange or yellow solution in methanol are listed according to their molecular weights. Attempts are made to elucidate the structure also. KAR

- 2784 PEISKER (K). Separation and visualization of multiple glucose oxidase forms. *Nahrung.* 30(1); 1986; 89-91 (German)

- 2785 BERRY (SK) and GRAMSHAW (JW). Some new volatile compounds from the non-enzymic browning reaction of glucose-glutamic acid system. *Z. Lebensmittel. Unters. Forschung.* 182(3); 1986; 219-23

The volatile compounds from the Maillard reaction in the glucose - glutamic acid system were analysed by combined gas chromatography - mass spectrometry. Of the 50 peaks detected, 42 components comprising 2 acids, 2 alcohols, 5 carbonyls, 2 esters, 4 lactones, 17 furans, 4 pyrazines and 3 pyrroles were identified, four of which tentatively.

Decadien-2,4-al, 2-n-pentyl furoate, 2-(2'-furyl)-pyrzone, γ -nonalactone, 2-(2'-furyl)-5- or 6-methylpyrazine were previously not reported to occur in heated sugar - amino acid browning systems. The compound, 5-formyloxymethyl-2-furfural has apparently not yet been recorded in the chemical literature. The compound 5-acetoxymethyl-2-furfural had an aroma close to that of bread whereas 5-formyloxy-methyl-2-furfural exhibited a very faint sweet burnt aroma. AA

- 2786 MODDERMAN (JP). Technological aspects of use of sulphiting agents in food. *J. Assoc. Off. Anal. Chem.* 69(1); 1986; 1-3
Discusses briefly the current literature on scientific knowledge of sulphiting agents in food, basic definitions of sulphiting agents and their chemical behaviour in food. BSN
- 2787 LAWRENCE (R), CONSOLACION (F) and JELEN (P). Formation of structured protein foods by freeze texturization. *Food Technol.* 40(3); 1986; 77-82, 90
Aspects covered include: principle of freeze texturization, ice crystal formation, effects of freezing geometry, and reactions before and during freezing. KAR
- 2788 MOHR (B) and KROLL (J). Model tests about the interactions between protein and emulsifier. *Lebensmittelindustrie.* 33(1); 1986; 17-20 (German)
The interactions of selected proteins and emulsifiers are examined by model tests by the help of individual analytical methods. The results show that the interactions between casein or gliadin and emulsifiers are of hydrophilic nature above all and those between glutenin and emulsifiers are of hydrophobic nature in the first place. AA
- 2789 GARTRELL (MJ), CRAUN (JC), PODREBARAC (DS) and GUNDERSON (EL). Pesticides, selected elements, and other chemicals in adult total diet samples, October 1980-March 1982. *J. Assoc. Off. Anal. Chem.* 69(1); 1986; 146-59
- 2790 BITSCH (R), SALZ (I) and HOTZEL (D). Determining the biotin content in foodstuffs by means of a protein bond assay. *Dtsch. Lebensmittel-Rundschau.* 82(3); 1986; 80-83 (German)
Using [³H]-Biotin as tracer and avidin as binder the biotin content in foodstuffs could be quantitatively and reproducibly determined by a protein binding assay in the range from 0.1 to 1.2 ng (0.5-6 pM). Non bound Biotin is separated by adsorption on dextran-coated charcoal. Biotin from foodstuffs is released by proteolysis with papain. The precision of this assay amounts to $\pm 10\%$. According to this assay the biotin content of several vegetable and animal foodstuffs is in the same range as listed in nutrition tables being microbiologically determined. AA
- 2791 YURAWECZ (MP) and PUMA (BJ). Gas chromatographic determination of electron capture sensitive volatile industrial chemical residues in foods, using AOAC pesticide multiresidue extraction and cleanup procedures. *J. Assoc. Off. Anal. Chem.* 69(1); 1986; 80-86
- 2792 WALLACE (BG) and SHERREN (AJ). Measurement of aldrin in air by gas chromatography with sorbent-filled trapping tube. *J. Assoc. Off. Anal. Chem.* 69(1); 1986; 93-7
- 2793 FEHRINGER (NV) and WALTERS (SM). Evaluation of capillary gas chromatography for pesticide and industrial chemical residue analysis. II. Comparison of quantitative results obtained on capillary and packed columns. *J. Assoc. Off. Anal. Chem.* 69(1); 1986; 90-93

- 2794 ANDERSON (C). Ion chromatographic determination of sulphites in foods. J. Assoc. Off. Anal. Chem. 69(1); 1986; 14-9

Ion chromatography (IC) is shown to be a promising technique for the determination of sulphites (SO_2 , SO_3) in foods. Results of a 10 minutes flash distillation and 10 minutes IC determination compare favourably with the results from the conventional Monier-Williams method for total sulphite in a variety of food matrices. The IC technique also provides a wealth of additional information, such as (1) sulphite, and sulphate (oxidized sulphite) content of the spiking or treatment solution, (2) residual sulphite applied to the food after oxidation losses in the treatment process, (3) free sulphite in foods, and (4) total sulphite in foods. As a further check on the Monier-Williams method, the sulphate content of the trapping solution can be determined by IC. Because the IC technique traps the liberated SO_2 in a non-oxidizing rather than an oxidizing medium, it is considered free from interfering sulphides and organic sulphur-containing groups which can give false positives in the Monier-Williams method, IC thus offers a high speed, more sensitive, and cost-effective alternative to conventional techniques for the determination of sulphite in foods. AA

- 2795 DARDENNE (P) and BISTON (R). Discriminant analysis applied to granulometry control of products analysed by near-infrared reflectance spectroscopy. Sci. Aliment. 6(1); 1986; 1-14 (French)

- 2796 WARNER (CR), DANIELS (DH), JOE (FL) Jr. and FAZIO (T). Reevaluation of Monier-Williams method for determining sulphite in food. J. Assoc. Off. Anal. Chem. 69(1); 1986; 3-5

Monier-Williams estimation gave > 90% recovery of sulphite added to foods like grape, hominy, dried mangoes and lemon juice; however, less than 85% recovery was observed with broccoli, soda crackers, cheese peanut, butter crackers, mushrooms and potato chips. Sulphite levels ranged in commercial food products dried apple slices and cream shery from 1400 ppm to 25 ppm respectively. BSN

FOOD LAWS AND REGULATIONS

Nil

FOOD MICROBIOLOGY

- 2797 SHARPE (AN). Instrumenting food microbiological analysis. Food Technol. Aust. 38(1); 1986; 26-30, 33

Some available instrumentation is briefly discussed mainly from the view point of its basic concepts, versatility and the acceptability of data - for example the spiral plater, and the Iso Grid filter, conventional electronic colony counter, automated DEF and ATP determination. Finally, the electrical impedance method is used to introduce an approach to analytical microbiology that could provide closer assurance of food quality. KAR

- 2798 CHLADEK (L), BURIC (J), SUSTR (J) and BALINT (St). Development and testing of an axially stirred fermenter. Lebensmittelindustrie. 33(1); 1986; 22-5 (German)

The principle of axial pulsation mixing has been explained in detail. The method of using such a fermenter for experimental work has been described and elucidated by means of examples: e.g. process for the production of citric acid; or studies of the morphology and dynamics of *Aspergillus niger* growth in a fermenter mixed by rotation and

one mixed by axial pulsation. An evaluation of these different stirring systems for the cultivation of *Aspergillus niger* has also been reported. KMD

Bacillus

- 2799 MOHAMED (AA), EL DIWANY (AI), SLEM (MH) and SHAKER (HM). Studies on β -galactosidase from *Bacillus stearothermophilus* NRC 16. II. Purification and utilization. Dtsch. Lebensmittel-Rundschau. 82(2); 1986; 53-6 (German)

Thermostable β -galactosidase (β -D-galactoside galactohydrolase, EC 3.2.1.23) from *Bacillus stearothermophilus* NRC 16 was purified 75.0 and 122.88 fold by fractionation by column chromatography on Sephadex G-100 and DEAE Sephadex A.50. The Michaelis constant was determined and found to be 4×10^{-4} $\mu\text{mol/l}$ using O-Nitrophenyl- β -D-galactopyranoside as substrate. Partial lactose hydrolysis in skim milk was studied at 55 and 37 C. The higher enzyme concentration (0.6 mg/ml) hydrolysed 45.64% lactose in 1 hour and 52.12% in 4 hour, while the lower enzyme concentration (0.125 mg/ml) hydrolysed 29.75% lactose in 1 hr and 40.22% in 4 hours at 55 C. The activity of starter culture and the coagulation time required for the manufacture of zabadi from hydrolysed skim milk were studied. AA

- 2800 RAJKOWSKI (KT) AND MESSER (JW). Applicability of the *Bacillus stearothermophilus* disc assay for penicillin residues in casein-caseinates. J. Food Prot. 49(2); 1986; 99-103

Six buffer systems were examined as hydrating solutions for assaying antibiotic residues in bovine casein or caseinates by the qualitative *Bacillus stearothermophilus* disc assay method. Formic acid and 1% potassium phosphate buffer systems were suitable in that they did not react adversely with the *B. stearothermophilus* spores or cause degradation of penicillin. With the formic acid buffer, a 20% casein slurry and a 10% caseinate slurry were sufficiently fluid to allow capillary saturation of a 12.7 mm paper disc. Casein and caseinate rehydrated with 1% potassium phosphate buffer were too viscous to permit saturation of a disc. The detectable level in a 20% casein slurry and a 10% caseinate slurry was ≥ 0.004 IU penicillin G/ml. Casein and caseinate prepared from potassium or procaine penicillin G-contaminated skim milk contained no detectable level of antibiotics as determined by the *B. stearothermophilus* disc assay method. AA

Yeasts

- 2801 JONES (RC). Product potential. Food Flavour. Ingrid. Process. Packag. 8(2); 1986; 31,33,35

Discusses importance of yeast in food industry in relation to yeast strain selection/bread production dried food yeast, yeast extract, flavour characteristics and whole dried autolysed yeast. BSN

Mushrooms

- 2802 ZAKIA BAND and RAJARATHNAM (S). Vitamin values of *Pleurotus* mushrooms. Qual. Plant. Plant Foods Hum Nutr. 36(1); 1986; 11-5

Ascorbic acid, thiamine, niacin, riboflavin, pantothenic acid and folic acid contents were determined in four different species of *Pleurotus* mushroom grown on wet chopped unfermented rice straw. The estimated values for the respective vitamins ranged from 92-144, 1.36-2.23, 60.6-73.3, 6.66-8.97, 21.1-33.3 mg and 1222-1412 μg per 100 g mushrooms on dry weight basis. These vitamin values were comparable with those of *Agaricus bisporus*, but were higher than those of *Auricularia*, *Lentinus* and *Volvariella*. AA

FOOD ADDITIVES

Butylated hydroxytoluene

- 2803 LINDENSCHMIDT (RC), TRYKA (AF), GOAD (ME) and WITSCHI (HP). The effects of dietary butylated hydroxytoluene on liver and colon tumor development in mice. *Toxicology*. 38(2); 1986; 151-60

Male and female C3H mice were fed a diet containing 0.5% or 0.05% of the antioxidant butylated hydroxytoluene (BHT). After 10 months, male but not female animals had a significantly increased incidence of liver tumors compared to animals kept on a BHT-free control diet. In a second experiment, male BALB/c mice were treated subcutaneously with the carcinogens dimethylhydrazine (DMH) or intrarectally with methylnitrosourea (MNU). A diet containing 0.5% BHT significantly increased the incidence of colon tumors in DMH treated animals but had no effect in mice given MNU. It is concluded that the effect of BHT on tumor development depends on strain and target organ examined and possibly also on the chemical carcinogen used. AA

Curcumin

- 2804 TONNESEN (HH) and KARLSEN (J). Studies on curcumin and curcuminoids. VII. Chromatographic separation and quantitative analysis of curcumin and related compounds. *Z. Lebensmittel. Unters. Forschung*. 182(3); 1986; 215-8

Chromatographic analysis of curcumin and structurally related compounds is described. The poor reproducibility of the quantitative analyses is due to the interaction between the 1,3-dicarbonyl group of the molecules and the solid chromatographic support. By careful selection of the chromatographic conditions a successful quantitative analysis could be achieved. AA

CEREALS

- 2805 BEGGEL (H). Application of a combine-harvester aspirator for grain intake and cleaning in a mill. *Getreide Mehl. Brot*. 40(1); 1986; 3-8 (German)

The aspirator of a combine-harvester can always be accommodated in the process diagram of the grain cleaning section in a flour mill. It facilitates optimal utilization of the machinery in the mill. Its outstanding cleaning capabilities make it ideal for grain pre-cleaning in a flour mill. KMD

- 2806 BALTENSPERGER (W). A very interesting new machine conceived from grain cleaning - the combinator. *Getreide Mehl Brot*. 40(2); 1986; 40-41 (German)

The combinator is a machine that makes repeated use of compressed air for grain cleaning. It consists of a "concentrator" and a "stone separator", or "Vibrostoner", which are mounted one above another on a single frame. The machine occupies a key position in the flow diagram of the grain cleaning section of a mill, and enables one to make a multi-layered rationalization of the task of cleaning grain. It can be installed in both newly built as well as existing flour mills. KMD

- 2807 CLARK (JP). Texturization processes in the cereal foods industry. *Food Technol*. 40(3); 1986; 91-3

The texturization processes listed and described include flak-

ing, puffing and baking. KAR

- 2808 TRUCKSESS (MW), FLOOD (MT) and PAGE (SW). Thin layer chromatographic determination of deoxynivalenol in processed grain products. *J. Assoc. Off. Anal. Chem.* 69(1); 1986; 35-6

The modified TLC method of Truckess et al (*J. Assoc. Off. Anal. Chem.* 1984, 67, 40-43) for determination of deoxynivalenol (DON) in high sugar breakfast cereals, corn syrup and beer consists of addition of celite to substrate before extraction with acetonitrile-water (84+16); filtration through an alumina-charcoal celite (0.5+0.7+0.3) column, evaporation of filtrate to dryness, redissolution in water and passage through an octylsilyl reverse phase column. DON was then eluted with anhydrous ethyl ether. Residue remaining after elute was evaporated to dryness was dissolved in CHCl_3 -acetonitrile (4+1) and chromatographed on AlCl_3 -impregnated silica gel plates. The blue fluorescent DON spot was quantitated fluorodensitometrically after heating TLC plate at 120°C for seven minutes. Breakfast cereals, added at 100, 200 and 400 ng/g and syrups and beer at 50, 100 and 200 ng/g levels showed recoveries averaging 86%. Limit of determination of these products was around 50 ng/g. BSN

- 2809 CLOWER (M) Jr., MCCARTHY (JP) and CARSON (LJ). Comparison of methodology for determination of ethylene dibromide in grains and grain-based foods. *J. Assoc. Off. Anal. Chem.* 69(1); 1986; 87-90

Three commonly used methods for determination of ethylene dibromide (EDB) in grains and grain products have been compared. EDB residues were extracted by (1) soaking in hexane, (2) triple co-distillation with hexane from an aqueous sample solution, and (3) soaking in acetone-water (5+1). Each method was used for triplicate analyses of 12 samples containing incurred residues of EDB ranging from about 10 to 1000 ppb and representing whole grains (wheat and oats) and intermediate grain-based products such as corn meal and flour. The 4-day hexane soaking method extracted the least EDB. In some cases, this was half of the amount determined by the other methods. Levels from soaking in acetone-water were equal to, or up to 25% greater than, those from distillation. Although soaking for 2 days is required for whole grains in the method, a period of only 16 hours was found acceptable for ground products. Results were obtained faster with the distillation method, but more analyst time per sample was required. A single distillation recovered about 80% (40-60% from wheat) of total EDB extracted by triple distillation. Foaming was reduced by the addition of concentrated H_2SO_4 to the aqueous hexane-sample mixture, plus stirring during distillation, thereby allowing complete recovery of the hexane. AA

- 2810 KONISHI (Y), YOSHIDA (S) and NAKAMURA (A). Determination of ethylene dibromide in foods and grains by high resolution capillary gas chromatography with electron capture detection. *J. Assoc. Off. Anal. Chem.* 69(1); 1986; 97-100

Ethylene dibromide (EDB) levels in food samples were determined by gas chromatography with a high-resolution capillary column and electron capture detector. The capillary column used was 3 mm id x 25 m cross-linked 5% phenylmethyl silicone. Column temperature was set at 40°C by a coolant containing carbon dioxide gas. Optimum temperatures of the injection port and detector were 200 and 350°C, respectively. The detection limit was 0.5 ppb and linear from 1 to 20 pg on the dynamic range. EDB residues in food samples were extracted with n-hexane by steam distillation. A few impurity peaks appeared near EDB on the chromatogram; however, the EDB peak was resolved. Recoveries of EDB from wheat and brown rice ranged from 66.1 to 99.6%. EDB was detected in 3 samples of imported wheat at a range of 0.74-1.70 ppb, and was not detected at all in 37 samples. The EDB remaining in EDB-

fortified cookies after baking was examined. The amounts of EDB were reduced to 30 to 50% of the original amounts by kneading the dough, and to below 1.5% by baking. AA

Barley

- 2811 GOTHARD (PG) and SMITH (DB). A computer-controlled micro-malting apparatus. *J. Cereal Sci.* 4(1); 1986; 71-8

An automated, computer-controlled malting apparatus suitable for assessing the small samples produced by barley breeders is described. This apparatus enables one operator to malt and analyse more than 100 samples per week. Results showed that the discriminating ability of the automated system compared favourably with the more complex and slower manual malting method currently used in this laboratory. These results suggest that the system is well suited for screening breeding material and the increased efficiency enables more crosses to be analysed or more selections to be made from earlier generations. AA

- 2812 SOSULSKI (FW), WRIGHT (AT) and HOOVER (R). Evaluation of protein nutritive value in barley and wheat cultivars using *Aspergillus flavus*. *Qual. Plant. Plant Foods Hum. Nutr.* 36(1); 1986; 63-73

The fungus *Aspergillus flavus* was used to evaluate the protein nutritive value of barley and wheat cultivars with a wide range in protein and amino acid concentrations. The biomass yield, after 72 hours incubation on isonitrogenous diets, also varied widely among barley or wheat cultivars. However, biomass was more closely associated with sample weight or glucose supplementation of the medium than with amino acid concentrations. Only threonine, serine and histidine in barley proteins gave low positive correlations with biomass yield at all energy levels in the diet, and no consistent correlations were found in the wheat experiment. Also biomass mycelium varied in nitrogen concentration, depending on diet, and biomass weight was not a consistent measure of nitrogen retention by the mycelium. It was concluded that *A. flavus* was not a satisfactory organism for rapid screening of barley or wheat cultivars for concentration of available amino acids, essential for human nutrition. AA

Rice

- 2813 JULIANO (BO) and PEREZ (CM). Kinetic studies on cooking of tropical milled rice. *Food Chem.* 20(2); 1986; 97-105

Four aged tropical milled rices differing in amylose content and/or starch gelatinization temperature (GT) were presoaked for 30 minutes and cooked in calculated weights of water based on amylose content at 80, 90, 100, 110 and 120 C. Differences in cooking rates were evident below 100 C. Activation energy of cooking, derived from Arrhenius plots of cooking rate constant and reciprocal temperature, ranged from 76 to 121 kJ/mole at 80-90 C and 31-57 kJ/mole at 90-120 C. Cooking rates were lower and activation energy values were higher for intermediate GT samples than for low GT samples. AA

- 2814 AZUDIN (MN) and MORRISON (WR). Non-starch lipids and starch lipids in milled rice. *J. Cereal Sci.* 4(1); 1986; 23-31

- 2815 JULIANO (BO) and GODDARD (MS). Cause of varietal difference in insulin and glucose responses to ingested rice. *Qual. Plant. Plant Foods Hum. Nutr.* 36(1); 1986; 35-41

Combined data on four rices differing in amylose content suggested that difference in the response or the increase in blood plasma insulin and glucose in man to ingested rice was a result of difference in Amylograph cooked paste consistency and amylose constant rather

than to difference in starch lipids and starch gelatinization temperature. AA

- 2816 ELLIS (JR), VILLAREAL (CP) and JULIANO (BO). Protein content, distribution and retention during milling of brown rice. *Qual. Plant. Plant Foods Hum Nutr.* 36(1); 1986; 17-26

Brown rice of IR36 and IR42 check samples from the 1982 dry and wet season yield trials showed good correlation of milled-rice protein and brown-rice protein ($r = 0.97$, $n = 40$) with 10% bran-polish removal by an emery abrasive mill. Among selected grain samples of both varieties, 80 to 86% of brown-rice protein was retained in the milled rice with both friction and abrasive mills. Stereological morphometry of 1- μ m-thick sections showed that endosperm storage protein decreases in amount with increasing distance from the aleurone layer. A similar protein gradient was found in both average-protein and high-protein samples. Milling removed all of the pericarp, seed coat and nucellus, and virtually all of the aleurone layer and embryo, but removed very little of the nonaleurone endosperm, except from the lateral ridges. AA

- 2817 ABDEL-AAL (ESM), YOUSSEF (MM), ADEL-SHEHATA (A) and EL-MAHDY (AR). Extractability and functionality of rice proteins and their application as meat extenders. *Food Chem.* 20(1); 1986; 79-83

Two protein isolates were produced from broken rice - protein isoelectric precipitate (PIP) and partially hydrolyzed protein preparation (PHP). Isolates and rice flour (RF) were compared with regard to proximate chemical composition and functional properties. Also, PIP was compared with RF as a meat extender of sausage at the 20%, 30% and 40% levels. The PIP was found to be preferable to RF at all substitution levels. AA

- 2818 PRAVINDRA CHARY (M), GIRISHAM (S) and REDDY (SM). Influence of different seed-borne fungi of rice (*Oryza sativa* L.) on the production of citrinin by *Penicillium citrinum*. *J. Food Sci. Technol. (India)* 23(3); 1986; 160-62

The influence of different seed-borne fungi of rice (*Oryza sativa*) on growth of *P. citrinum* was evaluated by inoculating the buffered 2% malt extract agar (pH 6.0) with 26 different fungal species pairing with citrinin. The plates were incubated at $27 \pm 2^\circ\text{C}$ and examined on alternate days for 10 days. *Asp. niger* and *Trichoderma viride* completely suppressed the citrinin production by *P. citrinum*. *Drechslera oryzae* and *Phaeotricocconis crotalariae* failed to inhibit citrinin production. No correlation was found between the type of microbial interaction and citrinin production by *P. citrinum*. KAR

Rice bran

- 2819 SREENARAYANAN (VV) and CHATTOPADHYAY (PK). Thermal conductivity and diffusivity of rice bran. *J. Agric. Eng. Res.* 34(2); 1986; 115-21

A transient heat flow method for the simultaneous determination of thermal conductivity and diffusivity of rice bran is described. Experiments were performed to study the effects of moisture content, temperature and bulk density of rice bran on these properties. It was observed that the thermal conductivity and diffusivity of rice bran increased from $0.086 \text{ W/m}^\circ\text{C}$ and $9.34 \times 10^{-8} \text{ m}^2/\text{s}$ respectively to $0.158 \text{ W/m}^\circ\text{C}$ and $12.1 \times 10^{-8} \text{ m}^2/\text{s}$ when the moisture content, temperature and bulk density of bran increased from 7% (w.b.), 42°C and 410 kg/m^3 to 15% (w.b.), 68°C and 490 kg/m^3 , respectively. AA

Wheat

- 2820 SOMMER (R). 30 years of export of wheat mills. *Lebensmittelindustrie*. 33(1); 1986; 31-3 (German)
 Poland, India, Lebanon, Greece and Egypt were the first countries to which the wheat mills manufactured by VEB Muhlenban Dresden were exported. Today, these mills can be found in 22 countries outside the GDR. The important characteristics of these mills, which deserve to be mentioned, are: (i) new and well-developed machinery and process for grain cleaning; (ii) newly developed machinery and process for grain milling; (iii) a flour-mixing and flour-silo complex; and (iv) possibilities of energy savings. KMD
- 2821 SOMMER (R). Some aspects and experiences with the construction and enlargement of capacity of a wheat mill (150 t wheat/day). *Getreide Mehl. Brot*. 40(2); 1986; 41-6 (German)
 The fundamental assumptions that have to be made before the construction of a wheat flour mill have been discussed. The existing conditions and technological parameters must first be established. Questions relating to energy consumption, and the desired end-product quality have also to be decided. The cost of plant automation and control is another decisive factor. All these points have been taken into consideration in this report on the reconstruction of a flour mill (capacity 150 t wheat/day) in Guben. KMD
- 2822 WILLIAMS (PC) and SOBERING (DC). Attempts at standardization of hardness testing of wheat. I. The grinding-sieving (particle size index) method. *Cereal Food World*. 31(5); 1986; 359, 362-4
 The method based on the grinding/sieving (particle size index) test was tested by 12 collaborators. All collaborators could distinguish clearly among wheat types and the average coefficient of correlation among collaborators was 0.995. Alternative methods for determining wheat hardness were also tested; near infra red reflectance spectroscopy was suggested as a rapid method for testing wheat hardness in view of its high correlation to the Burr mill sieved PSI method; its simplicity and its rapidity. KAR
- 2823 MORRISON (WR) and SCOTT (DC). Measurement of the dimensions of wheat starch granule populations using a coulter counter with 100-channel analyzer. *J. Cereal Sci.* 4(1); 1986; 13-21
 A method is described for measuring the size distribution of wheat starch granules, using a Coulter Counter model ZM, 100-channel analyzer and a log range expander coupled to a computer. The raw data (counts per channel) showing the characteristic bimodal starch granule size distribution could be described by two overlapping normal distributions for the small B-granule and large A-granule populations respectively. Hydrated starch granule dimensions, including mean and modal volumes and diameters, specific surface areas, and volume or weight percentage A- and B-granules, were calculated from the raw data or from normalised data. The method is precise and reproducible, and it has been used to demonstrate varietal differences and edaphic and climatic effects on starch granule dimensions. AA
- 2824 RAM (BP) and NIGAM (SN). A comparative study of the fingerprints of pepsin digests of gliadins and glutenins: Non-identity of comparable ninhydrin positive spots. *J. Food Sci. Technol. (India)*. 23(3); 1986; 117-20
 A comparative study of the gliadins and glutenins of 4 wheat varieties using fingerprinting technique and the amino acid composition of six pairs of comparable peptides from the gliadin and glutenin of one variety is reported. Finger printing of pepsin digests of gliadins and glutenins indicated that they were similar for each wheat

variety. Comparable pairs of acidic peptides isolated from the gliadin and glutenin of varieties, Sonalika differed among themselves in their amino acid compositions. Thus, the comparable spots in the fingerprints of gliadins and glutenins may not be of identical peptides. KAR

- 2825 HENRY (RJ) and McLEAN (BT). Re-evaluation of fluorescein dibutyrate staining as a method for assessment of pre-harvest sprouting in wheat and barley. *J. Cereal Sci.* 4(1); 1986; 51-6

- 2826 SKERRITT (JH) and MARTINUZZI (D). A simple and rapid turbidity test for sulphur deficiency in wheat grain. *J. Cereal Sci.* 4(1); 1986; 57-69

A simple test, based on the development of turbidity of grain extracts upon their dilution into a carbonate buffer, allowed the rapid identification of sulphur deficiency in wheat samples. Highly significant correlations between flour sulphur content and turbidity were found for sets of bread, cookie and multipurpose wheats, field-grown under a variety of sulphur and nitrogen fertilizer treatments. Turbidity was also highly correlated with sulphur contents of silo receival samples, which consist of any of a large number of cultivars. The method is equally applicable to wholemeal or flour samples, and turbidity development appears due to precipitation of certain sulphur-rich gliadin proteins. The rapidity of the test (as little as 30 minutes) and its simplicity and objectivity may allow its routine use for segregation of grain deficient in sulphur. AA

- 2827 EPPLEY (RM), TRUCKSESS (MW), NESHEIM (S), THORPE (CW) and POHLAND (AE). Thin layer chromatographic method for determination of deoxynivalenol in wheat: Collaborative study. *J. Assoc. Off. Anal. Chem.* 69(10); 1986; 37-40

A collaborative study of a rapid method for the determination of deoxynivalenol (DON) in winter wheat was successfully completed. The method involves sample extraction with acetonitrile-water (84 + 16), cleanup using a disposable column of charcoal, Celite, and alumina, and detection by thin layer chromatography after spraying with an aluminium chloride solution. Each of the 15 collaborators analysed 12 samples, 2 of which were naturally contaminated, and 10 to which DON was added, in duplicate, at levels of 0, 50, 100, 300, and 1000 ng/g. Average recoveries of DON ranged from 78 to 96% with reproductibilities of 30-64% and reproducibilities of 33-87%. The results of the study show that false positives were not a problem and that all of the analysts could detect DON at the 300 ng/g level or higher. The method has been adopted official first action. AA

- 2828 MEYER (D), WEIPERT (D) and MIELKE (H). Quality changes of wheat caused by *Fusarium*. *Getreide Mehl. Brot.* 40(2); 1986; 35-9 (German)

When wheat grain infested with *Fusarium culmorum* was milled, the ash content of the flours obtained in all the passages increased. Hence, the flour yield was diminished whenever a flour of low ash content was desired. The drop in baking quality that was observed is attributed, principally, to the deterioration in protein quality. The flours of *Fusarium* infested wheat samples exhibit a high degree of enzyme activity which changes the chemical composition of the flour. Significant structural changes have been observed in the wheat glutenins. KMD

- 2829 SINHA (RN), WATERER (D) and MUIR (WE). Carbon dioxide concentrations associated with insect infestations of stored grain. I. Natural infestation of corn, barley and wheat in farm granaries. *Sci. Aliment.* 6(1); 1986; 91-8

Concentrations of carbon dioxide in the intergranular air of infested grain in naturally infested and noninfested farm granaries

were measured to develop a method to detect insect infestations and spoilage of stored grain. Intergranular CO_2 concentrations of 2% or higher were recorded in nine non-airtight steel farm bins containing insect-infested corn, barley, or wheat in Manitoba, Canada and Minnesota, USA, during 1981-82. Three similar but noninfested bins had normal, ambient levels of intergranular CO_2 , ca. 0.03%. The predominant insects infesting the nine bins were: *Plodia interpunctella* (Hubner), *Cryptolestes ferrugineus* (Stephens), *C. pusillus* (Schonherr), and *Tribolium castaneum* (Herbst). Information on microflora, mites, seed germination, and free fatty acids associated with grain samples indicated that the crops were in various stages of deterioration in the pest infested bins, and that this deterioration was detected by CO_2 monitoring. AA

- 2830 SINHA (RN), WATERER (D) and MUIR (WE). Carbon dioxide concentrations associated with insect infestations of stored grain. 2. Infestation in wheat-filled jars. *Sci. Aliment.* 6(1); 1986; 99-106

The rates of carbon dioxide production by *Tribolium castaneum* (Herbst) and *Cryptolestes ferrugineus* (Stephens) in separate and combined populations were measured at 27.5 and 33° C and reported both descriptively and statistically. The measurements were made with 0.24 l glass-jars filled with wheat and initially infested with 12 adult insects per jar. Regression equations based on stepwise multiple regression analyses of the data on levels of CO_2 revealed significant relationship between CO_2 concentrations and individual life stages of *T. castaneum* and *C. ferrugineus*, the latter produced less CO_2 than the former species. The results also provide baseline data for developing prediction models that may allow for the determination of the levels of hidden infestations and incipient grain spoilage in a granary. AA

- 2831 SINHA (RN), WATERER (D) and MUIR (WE). Carbon dioxide concentrations associated with insect infestations of stored grain. 3. Infestation in bagged wheat. *Sci. Aliments.* 6(1); 1986; 107-18

Concentrations of carbon dioxide in the intergranular air of infested grain in commercially used bags were measured to develop a method to detect insect infestations in bag-stored wheat. Regression equations based on stepwise multiple regression analyses of laboratory data on levels of CO_2 produced by *Tribolium castaneum* (Herbst) caged in bags containing wheat revealed significant relationship between CO_2 production and individual life stages of the insect. The CO_2 production by *Cryptolestes ferrugineus* (Stephens) was similar to that produced by uninfested control bags. Carbon dioxide yield was most strongly correlated with the adult and early larval stages of *T. castaneum*. Detection of low levels of insect infestation through CO_2 measurement will be useful because it may signal a need to aerate or chemically treat the grain before heavy spoilage occurs. The results also provide baseline data for developing prediction models that may allow for the determination of the levels of hidden infestation and incipient grain spoilage in wheat stored in bags. AA

- 2832 SCHAFER (W). White flours vs. dark flours, a nutritional comparison. *Getreide Mehl Brot.* 40(1); 1986; 18-21 (German)

At the present time, public opinion has turned against white flours which are as being low in nutrient content, of little value, and even as harmful. This view is quite wrong, and is not supported by facts. Cereal flours supply 25% of the total calorie consumption of the German population, and nearly 3 million tonnes of starch per year. White flours supply at least 20% of the current intake of dietary fibre, 27% of the Mg 35% of the K requirement; they also supply 26% of the vitamin B1 requirement. KMD

- 2833 GALLIARD (T). Oxygen consumption of aqueous suspensions of wheat wholemeal, bran and germ: Involvement of lipase and lipoxygenase. *J. Cereal Sci.* 49(1); 1986; 33-50
- 2834 LUDEWIG (H-G). Production of fine baked goods from the milled products of whole wheat. *Getreide Mehl. Brot.* 40(2); 1986; 59-62 (German)
Whole wheat meal has been rediscovered by the proponents of an alternative life-style, and what is more - they are better able to meet the nutritional requirements of the population in respect of vitamin B1, folic acid, calcium, iron, and dietary fibre. Previously, whole wheat meal was used only bread-making; but not the author has shown that whole meal, made from soft wheats having only a medium protein, is also suitable for the fine pastry goods, such as cakes and biscuits. KMD
- 2835 VENKATESWARA RAO (G), SHURPALEKAR (SR) and MENDER (A). Studies on milling and noodle making quality of different extraction rate semolinas from durum wheat. *J. Food Sci. Technol. (India)* 23(3); 1986; 121-6
Durum wheat (var. Bijaga yellow) was milled separately using (i) Polisher-Miag mill and (ii) Buehler laboratory durum mill to obtain 50, 60, 70 and 80% extraction rates. Semolina from (i) contained higher ash than the respective extraction rate semolina from (ii) but they were comparable in their protein and pigment contents. Semolina obtained using (i) were slightly coarser, when compared with those of corresponding extraction rate semolina obtained from (ii). Stamping tests and visco-elastograph conducted on dough discs indicated that semolina from (ii) were slightly better than those from (i) in cooking quality. The different extraction rates indicated little difference in their cooking quality. Irrespective of the extraction rate or the milling method used, the form as indicated by fall of noodles was excellent and discrete, and the noodles were non-sticky, smooth, the consistency of bite was firm, smooth, non-doughy and non-sticky. The cooking quality of noodles from different extraction rates and different milling processes did not differ significantly. KAR

MILLETS

Maize

- 2836 COKER (LE). Uses and analysis of sulphites in the corn wet milling industry. *J. Assoc. Off. Anal. Chem.* 69(1); 1986; 8-10
Discusses: Principal uses of sulphiting agents in corn wet milling; residual levels of sulphiting agents in finished products; results of the Monier-Williams method and iodometric method; and sulphurdioxide estimation by a paranosaniline method. BSN

PULSES

Bengal gram

- 2837 PRATAPE (VM) and KURIEN (PP). Studies on puffing of Bengal gram. I. *J. Food Sci. Technol. (India)* 23(3); 1986; 127-30
Bengal gram was puffed after subjecting to 6-11% moisture, preliminary and roasting at 150 to 200 C for 30-135 seconds equilibrating after roasting and water-dipping of previously roasted and moisture conditioned grains. The effect of impact was assessed by passing the roasted grains through a laboratory model puffing roller, coupled with a hot plate and in a centrifugal sheller at different revolutions. The process parameters in successive steps for getting maximum purfing are

as follows: (i) initial grain moisture of around 7.8%, (ii) preliminary roasting of grains with sand at 170°C for 75 seconds (iii) tempering of grains for about 90 minutes to reach a moisture of about 4.9% (iv) dipping in water for 5 seconds to absorb 0.8% additional moisture, (v) final puffing of grains by roasting at 230°C for 30 seconds and (vi) impact between a roller and a hot plate for dehusking and splitting. Under the above conditions, the bulk volume of grains gets doubled on puffing. KAR

Cowpeas

- 2838 OLOGHOBO (AD) and FETUGA (BL). Changes in carbohydrate contents of germinating cowpea seeds. *Food Chem.* 20(2); 1986; 117-25

During 144 hours of germination of cowpea seeds total carbohydrates decreased. While starch, raffinose stachyose and verbascose levels decreased, the reducing sugars, including glucose and fructose, increased. Starch was the major carbohydrate and about 50% of it was hydrolysed after 144 hours germination. Lignin content increased slightly while hemicellulose and celluloses decreased. KAR

Dioclea grandiflora

- 2839 GRANT (G), McKENZIE (NH), MOREIRA (RA) and PUSZTAI (A). *Dioclea grandiflora* and *Dioclea sclerocarpa* seeds. A nutritional study. *Qual. Plant. Plant Foods Hum. Nutr.* 36(1); 1986; 47-61

Faba beans

- 2840 BOROWSKA (J) and KOZLOWSKA (H). Isolates from faba bean and soybean with lowered content of phytic acid and activity of the trypsin inhibitors. *Nahrung.* 30(1); 1986; 11-8

For obtaining protein isolates, water, whey, and waste effluents from a potato processing plant were used as extraction solvents. Isolates obtained on laboratory conditions were subjected to chemical and organoleptic tests. It was shown that proper steering of the processing allowed for obtaining isolates with lower phytic acid content and decreased activity of the trypsin inhibitors, although the efficiency of the process decreased also. Modified processing was more efficient for elimination of the phytic acid from soybean isolates compared to faba bean. It was also shown that isolate neutralization considerably improved their solubility and decreased the activity of trypsin inhibitors. AA

Horse gram

- 2841 GHORPADE (VM), KADAM (SS) and SALUNKHE (DK). Thermal stability and changes in trypsin inhibitor during germination and cooking of horse gram. *J. Food Sci. Technol. (India)* 23(3); 1986; 164-5

In horse gram (*Dolichos biflorus*) meal (defatted) application of dry heat (80°C) for 60 minutes did not inactivate the trypsin inhibitor (TI), but at 100°C heat for 60 minutes, 20% activity was lost. Autoclaving the meal at 120°C at 15 lb pressure destroyed the TI activity completely within 10 minutes. The extracted TI lost 100% activity at 100°C within 20 minutes. Soaking of horse gram seeds for 8 hours decreased the TI activity by 35%. Germination did not affect TI activity, but cooking resulted in 90% decreased in the inhibitor activity. KAR

Lima beans

- 2842 VEGA (A De La) and SOTELO (A). The nutritional quality and toxin content of wild and cultivated lima beans (*Phaseolus lunatus*). *Qual.*

Plant. Plant Foods Hum. Nutr. 36(1); 1986; 75-83

Lupin

- 2843 DAVIN (A) and BRILLOUET (JM). Separation and characterization of protein and cell wall material from dehulled white lupin (*Lupinus albus* L.) and changing (or Andean) lupin (*Lupinus mutabilis* sweet) meals by wet sieving under alkaline conditions. *Sci. Aliment.* 6(1); 1986; 61-80

Moth beans

- 2844 KADAM (SS), GHORPADE (VM), ADSULE (RN) and SALUNKHE (DK). Trypsin inhibitor in moth bean: Thermal stability and changes during germination and cooking. *Qual. Plant. Plant Foods Hum Nutr.* 36(1); 1986; 43-6

Trypsin inhibitor from moth bean was studied for thermal stability and changes during germination and cooking. The application of dry heat did not inactivate the inhibitor. However, autoclaving at 120 °C at 15 lbs pressure destroyed inhibitor activity completely. The extracted inhibitor lost 70% activity in 60 minutes when incubated at 100 °C. Soaking of moth bean seeds for 8 hours decreased trypsin inhibitor activity by 20%. The germination of seeds for 24 hours resulted in 70% reduction in inhibitor activity. No activity was detected in 48 hours germinated seeds. Germination (for 24 hours) followed by cooking of moth bean seeds destroyed the trypsin inhibitor completely. AA

Phaseolus vulgaris

- 2845 BEATRIZ PENA-VALDIVIA (C) and ORTEGA-DELGADO (ML). Partial chemical composition, free soluble sugars and unavailable carbohydrates in the embryonic axis and seed coat of *Phaseolus vulgaris* L. (Canario group). *Qual. Plant. Plant Foods Hum. Nutr.* 36(1); 1986; 27-34

Four varieties of common bean were examined, but there were no significant differences among them. Crude protein content (46.7% and 49.0%) was the main constituent in embryonic axes. The average values of ash, crude fiber and ether extract were 4.2%, 3.7% and 3.0% respectively. Starch was approximately three times more abundant (7.5%) than cellulose (2.7%). Hemicellulose B values were lower (5.5%) than hemicellulose A (9.2%). The mean value of the pectic substances in embryonic axes was 12.3%. The free ethanol-soluble sugars ranged from 2.9% to 4.9%. Verbascose, stachyose, raffinose, sucrose, and galactose were identified and quantified in embryonic axes. Seed coat flour contained cellulose (30.6%), ether extract (0.4%), ash (2.8%), and protein (5.4%). Free ribose, mannose, arabinose, and galactose were present in seed coats in amounts ranged from 0.009% to 0.031%. AA

OILSEEDS AND NUTS

Canola

- 2846 DAUN (JK). Erucic acid levels in Western Canadian canola and rapeseed. *J. Am. Oil Chem. Soc.* 63(3); 1986; 321-4

Canadian exports of canola seed and oil are shown to meet the Generally Recognised as Safe (GRAS) standard of 2% erucic acid. Canadian seed exports averaged less than 2% erucic acid since 1980 and individual cargoes, with one exception, contained less than 2% erucic acid since 1982. Most Western Canadian crushing plants have produced oil with less than 2% erucic acid since 1981, and all since 1984. Areas where *B. campestris* varieties of canola predominate may still

have difficulty in meeting a 2% erucic acid standard without screening incoming seed. Further reductions in the erucic acid level of *B. campestris* canola varieties are desired. AA

Linseeds

- 2847 STAHL (E), RAU (G) and CARIUS (W). Cracking and puffing of plant material by CO_2 high pressure treatment I. Linseed and hibiscus flowers. *Z. Lebensmittel Unters. Forschung.* 182(1); 1986; 33-5 (German)

Important properties of plant materials can be improved by treatment with carbon dioxide underpressure, followed by fast decompression. This cracking increases the swelling index of linseed by almost 20 per cent and even more if the linseed has been de-oiled by high pressure extraction. From puffed hibiscus flowers, a tea infusion can be prepared in which the ingredients such as, acids and pigments are extracted more rapidly and completely. AA

Poppy seeds

- 2848 HOFFMANN (J) and BLASENBREI (P). Cadmium in the blue poppy seeds and in poppy seed containing products. *Z. Lebensmittel-Unters Forschung.* 182(2); 1986; 121-2

Blue poppy seeds, semi finished products and finished baked goods with poppy seeds, were analyzed for cadmium by atomic-absorption spectrometry. The average content was 0.739 mg/kg (median 0.654 mg/kg) for poppy seeds, 0.317 mg/kg (median 0.366 mg/kg) for semi finished products and 0.107 mg/kg (median 0.088 mg/kg) for baked goods. Poppy seeds therefore must be considered as one of the most cadmium contaminated foods. For consumers, especially children, recommendations for consumption should be established. AA

Rapeseeds

- 2849 WHITE (NDG) and NOWICKI (TW). Persistence of malathion and pirimiphos-methyl residues in two species of rapeseed stored at various moisture contents and temperatures. *Sci. Aliment.* 6(2); 1986; 273-86

Soyabeans

- 2850 MWANDEMELE (OD). Relationship between flavour and oligosaccharide content of soybean varieties. *J. Food Sci. Technol. (India)* 23(3); 1986; 131-2

The relationship if any, in soybean varieties between the organoleptic score (flavour) and the oligosaccharides (sucrose, raffinose and stachyose) was investigated to differentiate soybean lines on flavour basis. Organoleptic testing of 72 varieties of canned whole soybean indicated that some varieties have more flavour than others, but the chi square test did not reveal the existence of a strong relationship between flavour and oligosaccharide content. KAR

- 2851 VEDRINA-DRAGOJEVIC (I) and SEBECIC (B). Modified lumiflavin procedure for determination of riboflavin in soybean. *Z. Lebensmittel Unters Forschung.* 182(2); 1986; 127-30

Investigation of the application of different methods for riboflavin determination proved the lumiflavin method recommended by Hausheer et al to be the most suitable one for determining riboflavin in materials of complex composition, such as soybean. However, due to inadequate preparation of the blank sample, the method is burdened by a positive error. By modifying the blank sample and certain modifications in the procedure, more precise results, greater speed and

simplification of the method were achieved. The soybean sample analysed by this modified procedure gave a mean recovery and standard error of 102.9 ± 2.1 for added riboflavin, which is very satisfactory. AA

- 2852 CHEN (XJ), BAU (HM), GIANNANGELI (F) and DEBRY (G). Effect of microwave heating of whole soybean meal on the physicochemical and nutritional properties of proteins. *Sci. Aliment.* 6(2); 1986; 257-72 (French)

The effects of two thermal treatments - microwave cooking and conventional autoclave cooking - on the physical and chemical characteristics and nutritional properties of whole soybean meal have been compared. The factors most sensitive to heat treatment were studied: viz. solubility, content of non-protein nitrogen (NPN); trypsin inhibitor activity; and yield of extracted protein. Steam heating was more efficient in inhibiting the activity of the trypsin inhibitor, but it also made the proteins more insoluble. Microwave treatment was optimal if the meal was heated to 100°C over a period of 20 minutes with the humidity of the samples at 40%; these conditions ensured the best nutritional and functional quality of the soybean products. The microwave heating also assured a higher protein recovery from soybean meal than steam treatment. KMD

TUBERS AND VEGETABLES

- 2853 GREENWOOD (DJ) and HUNT (J). Effect of nitrogen fertilizer on the nitrate contents of field vegetables grown in Britain. *J. Sci. Food Agric.* 37(4); 1986; 373-83

Out of the 14 vegetables and two arable crops grown with high doses of nitrogen fertilizer, only foliage crops always contained substantial quantities of NO_3 which increased with N-fertilizer application. Grains of legumes and cereals, storage roots of carrots, parsnips and sugar beet and onion bulbs and leeks contained no detectable amounts of NO_3 even at high doses of N-fertilizer application. It is estimated from the data and a household survey that the average British person consumes about 60 mg $\text{NO}_3\text{-N}$ per week in field vegetables. If N-fertilizers were withheld, consumption would be about 30 mg and it excess were applied it would be about 120 mg $\text{NO}_3\text{-N}$ week. KAR

- 2854 BHOBE (AM) and PAI (JS). Frozen storage of some Indian green vegetables. *J. Food Sci. Technol. (India)* 23(3); 1986; 133-5
- Okra (*Abelmoschus esculentus*), gherkin (*Coccinia cordifolia*), giant capsicum (*Capsicum annum* var. *Grossa*), coriander (*Coriandrum sativum*) leaves and fenugreek (*Trigonella foenumgraecum*) leaves were blanched, cooled, and after packing in polyethylene bags were frozen by immersing in an alcohol bath kept at -30°C and stored at $-18 \pm 2^{\circ}\text{C}$ for 105 days. The blanching in boiling water was done for 2 minutes for okra, 2.5 minutes for gherkin, 1.5 minutes for capsicum and 20 seconds for fenugreek. Coriander leaves were not blanched. Loss of chlorophyll was 3 to 7% during blanching and 17-24% during frozen storage for 3 months. The retention of ascorbic acid during frozen storage was 63-81% of the initial level. The high initial microbial count dropped rapidly after blanching and during frozen storage. *E. coli* was absent after 2 months of frozen storage. The frozen stored vegetables were acceptable even after 105 days by the panel members in respect of colour, flavour and texture. Colour loss was observed in coriander leaves after one month storage at -18°C . KAR

Colocasia

- 2855 HUSSAIN (M) and CHOWDHURY (BL). Preparation of dehydrated Mukhi (*Colocasia esculenta*) chips. *J. Food Sci. Technol. (India)* 23(3); 1986; 167-70

Chips of a cultivar of *Colocasia esculenta* (Mukhi) was made into 3-4 mm thick slices, and were subjected to 9 types of treatment like blanching or dipping in ethanol, or boiling or dipping and washing in water or dipping in potassium metabisulphate (KMS) followed by drying for 14 hours in a cabinet solar dryer. The mukhi chips were reconstituted by soaking in cold water for 1 hour and by boiling in water (400 g/l) for 40 minutes. and the quality was evaluated organoleptically by serving to panel members. Acid treatment with tartaric, citric or HCl improved their appearance and acceptability, whereas washing the acid by water and immersion in KMS were found to be highly acceptable. On reconstitution, the chips were of better eating quality and almost free from acidity and stickiness. The chips packed in polyethylene bags preserved well for 6 months. KAR

Potatoes

- 2856 HAJŠLOVA (J) and DAVIDEK (J). Sprout inhibitors IPC and CIPC in treated potatoes. *Nahrung*. 30(1); 1986; 75-9

The gradual decrease of IPC and CIPC in stored potatoes treated with sprout inhibition preparation Luxan Gro Stop was observed. The decrease of CIPC was slower than that of IPC. The presence of a small amount of both N-phenylcarbamates were proved even in peeled tubers. The penetration of CIPC into the flesh was faster in comparison with that of IPC. The decrease of the residue levels during cooking seemed to be the result particularly of their transfer into boiling water, for only a small amount of IPC and CIPC decomposed under these conditions. AA

- 2857 GOLAN-GOLDHIRSH (A). Effect of the add-back process on the free amino acid pool of potatoes. *Z. Lebensmittel Unters. Forschung*. 182(1); 1986; 29-32

The major losses in nitrogen and free amino acids (FAA) of the potato during the add-back (A-B) process were in the pre-cooking and mash-mixing steps. These losses were due to leaching of nitrogen compounds into the processing water and heating. The FAA pool of the potato is composed mainly of the amides (asparagine and glutamine), aspartic and glutamic acids (approximately 53%). These amino acids were degraded substantially during the add-back process. There was also a significant loss in valine, threonine, serine, leucine, phenylalanine, and arginine, but no change in γ -aminobutyric acid (GABA). AA

- 2858 PRAVISANI (CI) and CALVELO (A). Minimum cooking time for potato strip frying. *J. Food Sci.* 51(3); 1986; 614-7

The maximum force for shearing was used as texture parameter for raw and cooked potato strips. The force was satisfactorily correlated with the cook value C (equivalent cooking time at 100°C) showing complete cooking for $C \geq 300$ sec. Thermal histories measured at the centre of strips fried under different oil temperatures suggested the heat and mass transfer mechanisms involved in the frying process and allowed the calculation of the minimum frying time to assure cooking at the strip centre. This time was independent of the oil temperature and slightly dependent on the strip size. AA

- 2859 KOHN (R), DONGOWSKI (G) and BOCK (W). Binding of lead and copper ions to ethanol-insoluble substances from table potatoes. *Nahrung*. 30(1); 1986; 39-52 (German)

- 360 DOMAGALA (A) and SZEBIOTKO (K). An exchangers for food dehydrators used for drying potato pieces. Part 1. General - Discussion of design of heat exchangers, of the phenomena occurring in the machines, and the calculation of the water and heat requirements. *Ind. Aliment. Agric.* 103(1-2); 1986; 15-22 (French)

The author has explained the theory underlying the design of air-heating machines (heaters + exchangers), the quantities of air and heat required to dry potato pieces, and heat exchange in the steam exchanger. KMD

- 361 MOYLAN (JG), BOWES (FW) and PAPPIN (WJ). Evaluation of Monier-Williams and committee methods for bisulphite determination as used by the potato processing industry. *J. Assoc. Off. Anal. Chem.* 69(1); 1986; 11-4

Both the methods - Monier-Williams and the iodometric methods for determination of bisulphite in potato products were accurate and precise below 60 ppm. With Monier-Williams methods, sensity levels of 25 ppm are possible. Accuracy problems reflected by the coefficients of variation (Monier-Williams 47.4%; committee, 78.2%) as well as variability in recoveries and blank values for both methods produced qualitative rather than quantitative analytical data at low SO₂ concentrations. BSN

Yams

- 362 BARDALAYE (PC) and WHEELER (WB). Electron capture gas chromatographic determination of thiabendazole in yams. *J. Assoc. Off. Anal. Chem.* 69(1); 1986; 114-6

Lucerne

- 363 DOUILLARD (R) and COMPOINT (J-P). Purification and electrophoretic characterization of alfalfa ribulose biphosphate carboxylase. *Sci. Aliment.* 6(1); 1986; 81-9 (French)

Parsley

- 364 ROUET-MAYER (M-A), PHILIPPON (J), DUMINIL (J-M) and FONTENAY (P). The effect of blanching, crumbling of leaves and packaging on the stability of volatile organic emission from frozen parsley. *Sci. Aliment.* 6(2); 1986; 233-44 (French)

Brinjal

- 365 RAMA SUBBA RAO (V), SARKAR (DK), PUNNAIAH (KC), REDDY (GPV) and RAMA-SUBBAIAH (K). Studies on persistence of fenitrothion and phosalone residues on brinjal. *J. Food Sci. Technol. (India)* 23(3); 1986; 177-8
- Dissipation of fenitrothion and phosalone residues were studied on brinjal fruits for 14 days after spraying the insecticides. After 7 days of spray, the levels of fenitrothion and phosalone fell below the detectable limit from the initial deposit of 2.77 and 4.80 ppm observed soon after spray. From the results, a waiting period of 1.29 and 3.31 days for phosalone and fenitrothion is suggested to avoid the residual hazard of the pesticide to consumers. KAR

Salads

- 366 MARTIN (LB), NORDLEE (JA) and TAYLOR (SL). Sulphite residues in restaurant salads. *J. Food Prot.* 49(2); 1986; 126-9
- Sulphiting agents, which have been used as salad fresheners to prevent the enzymatic browning of restaurant salads, may pose a hazard to sulphite-sensitive asthmatics. Chopped lettuce treated with a com-

mercial salad freshener at the recommended level of 1 tablespoon per gallon (ca. 5.3 g/L) of dip solution can contain as much as 963 mg/kg (ppm) total SO_2 equivalents. Most of the sulphite in chopped lettuce is free SO_2 . If commercial salad fresheners are abused by using levels in excess of 1 tablespoon per gallon, progressively higher levels of residual sulphite are retained on the lettuce. Cole slaw prepared according to a typical commercial formulation contained 350 mg/kg total SO_2 . A survey of lettuce salads, cole slaw and potato salads from 25 local and national chain restaurants and delicatessens in Madison, Wisconsin, showed sulphite residue levels to be well below those of a treated salad, indicating a lack of sulphite use. AA

FRUITS

- 2867 MACLEOD (AJ). The flavour chemistry of tropical fruits. *Food Flavour Ingrid. Process. Packag.* 8(1); 1986; 38-9

Part II of an extract of a talk delivered to the British Society of Flavourists, deals with important attributes of ginger aroma compounds and volatile oils present in ginger samples. BSN

- 2868 PICK (FE), BEER (PRde) and DYK (LPVan). Copper content of South African fruits and vegetables. *Bull. Environ. Contam. Toxicol.* 37(1); 1986; 81-6

The detectable levels (> 0.04 mg/kg) of copper present in 645 market samples of different fruits and vegetables were below the legal maximum permissible residue limit of 20 mg/kg. BSN

- 2869 BLANCO (CC) and SANCHEZ (FG). Determination of gibberellic acid residues on fruits by synchronous scanning derivative spectrofluorometry. *J. Assoc. Off. Anal. Chem.* 69(1); 1986; 105-9

A synchronous derivative spectrofluorometric method is described for the determination of the plant growth regulator, gibberellic acid (GA3). The method is based on the formation of a fluorogen in concentrated sulphuric acid. The reaction is carried out at 85% sulphuric acid and in aqueous medium. The common fluorometric method with a linear dynamic range of 137-400 ppb, and a detection limit of 48 ppb is described. The synchronous first and second derivative method has linear dynamic ranges between 7.6-40 ppb and 12-40 ppb, with detection limit of 3.5 and 6.7 ppb, respectively. The influence of reaction variables and of other plant growth regulators present, and the application to residues on oranges, lemons, and grapes, are also described. AA

- 2870 SCHUPBACH (MR). Spray residues in fruit and vegetables. Results of official market checking in the city of Basel between 1900 and 1983. *Dtsch. Lebensmittel-Rundschau.* 82(3); 1986; 76-80 (German)

Results of a 4-year study and survey of pesticide residues by the official food control of the city of Basel are reported. Fruit and vegetables frequently contained residues (39% of all samples contained residues), but not high concentrations (usually only up to 25% of the tolerated maximum, 6% of all samples gave rise to objections). Biologically grown merchandise (organic agriculture methods) showed an exceptionally low contamination rate. A general trend of either increase or decrease could not be detected between 1970 to 84. AA

Blackcurrants

- 2871 RIGAUD (J), ETIEVANT (P), HENRY (P) and LATRASSE (A). 4-Methoxy-2-methyl-2-mercapto-butane. A major constituent of the aroma of the blackcurrant bud (*Ribes nigrum* L.). *Sci. Aliment.* 6(2); 1986; 213-20

(French)

- 2872 LE QUERE (JL) and LATRASSE (A). Identification of (+) spathulenol in the essential oil of blackcurrant buds (*Ribes nigrum* L.). *Sci. Aliment.* 6(1); 1986; 47-59

Bananas

- 2873 FERNANDEZ (T), FERNANDEZ (M) and CHORDI (A). Alteration of the composition of the fruit of *Musa cavendishii* caused by *Fusarium oxysporum* F. Sp. Cubense. (II). *Fruits.* 41(1); 1986; 25-80 (French)

Grapes

- 2874 TESNIERE (C), NICOL (M-Z), SARRIS (J), VERRIES (C), BOURZEIX (M), FLANZY (C), PRADAL (M) and HEREDIA (N). Relations between integrity degree of grape berries and their anaerobic metabolism. *Sci. Aliment.* 6(1); 1986; 31-46 (French)
- 2875 OUGH (CS). Determination of sulphur dioxide in grapes and wines. *J. Assoc. Off. Anal. Chem.* 69(1); 1986; 5-7
Discusses reasons for using SO_2 in wines and the theoretical aspects involved. Methods of analysis are also discussed. Data relating to SO_2 content of Californian wines are reported. BSN
- 2876 WINTERLIN (WL), KILGORE (WW), MOURER (CR), HALL (G) and HODAPP (D). Worker reentry into captan-treated grape fields in California. *Arch. Environ. Contam. Toxicol.* 15(3); 1986; 301-11

Lime

- 2877 KING (K), MITCHELL (JR), NORTON (G) and CAYGILL (J). In situ de-esterification of lime pectin. *J. Sci. Food Agric.* 37(4); 1986; 391-8
The in situ de-esterification of pectin in lime pulp by the action of pectinesterase (PE) has been investigated. It has been shown that the degree of pectin esterification is reduced to about 20% when the pulp is held at pH 8.5 for 90 minutes. The rate of de-esterification by the enzyme in situ is highest when the pH is in the range 7.5-9.0 and the NaCl concentration is 0.1-0.3M. At pH values above 9, chemical de-esterification becomes important. The activity of extracted lime PE was shown to be almost independent of pH in the range pH 6.0-9.0. It is suggested that the difference between the behaviour of the extracted and the in situ enzyme is due to the fact that the latter needs to be solubilized before it can act on some of the pectin in the pulp. In support of this, it is found that the proportion of lime PE which can be extracted from the pulp decreases with decreasing pH and ionic strength, reflecting electrostatic binding to the cell wall. AA

Mango

- 2878 ONKARAYYA (H). A rapid madeirization process to improve mango dessert wines. *J. Food Sci. Technol. (India)* 23(3); 1986; 175-6
Ascorbic acid was added at 0.1% (w/v) level to the dessert mango wines prepared from Raspuri, Totapuri, Mulgoa, Dashehari and Langra varieties of mangoes and madeirization was done at 50°C for 7 days. Fortification and madeirization increased the pH of wines, increased the ester content (9 to 46 mg/l) as also the aldehyde level, and volatile esters (in case of Raspuri and Langra varieties). Madeirization increased the colour and brightness of dessert wines from all varieties the increase being 6-44% for colour and 4-35% for brightness over the corresponding dry wines. Madeirization improved organoleptic

characters of all the dessert wines from 5 mango varieties and the improvement was mainly seen in colour, appearance, bouquet, freedom from acetic odour and development of characteristic medeira odour.
KAR

Melon

- 2879 RAMAKRISHNA (P). Melon seeds - evaluation of physical characteristics. *J. Food Sci. Technol. (India)* 23(3); 1986; 158-60

Musk melon (*C. melo*), long melon (*C. melo utilissimus*) and water melon (*C. vulgaris*) seeds, which are used as adjuncts in snack/sweet foods have kernels with rich source of protein and fat and the method of dehulling currently used is tedious and time consuming. The various physical characteristics of melon seeds was evaluated to find out the possibility of mechanically dehulling them. Minimum hull breaking load (0.7-1.1 kg) is needed if the pressure is applied at the edge near the sharp tip of the seed; hull breaking load is reduced appreciably for wet seeds. Since there is large difference in the carrying velocity of hull, seed and kernel, the hulls can be easily separated by aspiration. The kernels of musk melon and long melon are more rough than their seeds, whereas in water melon seeds are more rough than the kernels. Maximum water is picked up during the first 15 minutes of soaking, of which 70-80% are picked up by the hull only. This shows that (i) a maximum of 15 minutes soaking is enough to avoid undue breakages during dehulling and (ii) kernels pick up little water and subsequent drying, if any, will be easy. The length, breadth and thickness of melon seeds increased from 3 to 10% while soaking. KAR

SUGAR, STARCH AND CONFECTIONERY

- 2880 KHALEELUDDIN (K) and BRADFORD (L). Dual enzyme method for determination of total nonstructural carbohydrates. *J. Assoc. Off. Anal. Chem.* 69(1); 1986; 162-6

- 2881 BOURDON (B). Reflections on the chemical analysis of free carbohydrates containing Δ -galactosides. *Ind. Aliment. Agric.* 103(1-2); 1986; 33-9 (French)

Gabriel Bertrand's classical method of analysis of Δ -galactosides fails to give conclusive results when sucrose galactosides - such as raffinose, stachyose, verbascose, and other higher homologues - are present. The author has reviewed the various chromatographic and enzyme electrode methods that are being used for this type of analysis. He has then described a more specific method for the analysis of Δ galactosides, which makes use of an Δ -galactosidase found in coffee, combined with a chemical procedure, or a spectrophotometric procedure employing a polarimeter. KMD

Sugars

- 2882 DUTHOIT (E). Prospective study of antiseptics in a sugar factory. *Ind. Aliment. Agric.* 103(1-2); 1986; 25-31 (French)

The necessity of assuring antiseptics in sugar-rich solutions, and the use of certain antiseptic chemicals for this purpose are well known. The author discusses the selection and classification of certain chemical molecules, taking into account the possible effect of their presence, as residues, further downstream in the industrial sector; for example, the harmful effect, in distilleries, of residues of yeast killing compounds in sugar molasses. KMD

Molasses

- 2883 DHAMIJA (SS), DAHIYA (DS) and TAURO (P). Effect of molasses composition on ethanol fermentation. *J. Food Sci. Technol. (India)* 23(3); 1986; 162-4

Molasses procured from 8 different places was tested in media using *Saccharomyces cerevisiae* HAU-1 for ethanol production. The ash content of molasses ranged from 9-18%, pH from 4.8-5.5 and total sugars from 42.5-54.2%. The % ethanol produced ranged from 4.6 to 9.1% in 48 hours. The rate of fermentation and the volume of ethanol produced increased by supplementation with urea and phosphates. KAR

Monosaccharides

- 2884 PETRZICKA (M) and LINOW (F). Mass spectrometry of trimethylsilyl oxime derivatives of monosaccharides and galacturonic acid. *Nahrung*. 30(1); 1986; 97-100 (German)

Polydextrose

- 2885 MURRAY (P). The light one. *Food Flavour Ingrid Process. Packag.* 8(2); 1986; 22, 23, 25

Discusses applications of polydextrose in food processing with special reference to: composition; properties; metabolism and caloric value; toleration of JECFA ADI; reduced carcinogenicity; regulatory approval and labelling; UK approval; ice cream/frozen dairy desserts; baked goods; confectionery; other products; and the developing market. BSN

Honeys

- 2886 STADELMEYER (M) and BERGNER (KG). The proteins of honey. VII. Behaviour and origin of honey amylase. *Z. Lebensmittel-Unters Forschung*. 182(3); 1986; 196-9 (German)

Amylase was isolated from three types of honey: from rape plants, fir trees and from sugar-fed bees. No differences were found in the amylases present in the three types of honey. The molecular weight of the amylase was about 25000. It is concluded that honey amylase is an α -amylase which originates from the honey bee. Pollen and nectar are not sources of honey amylase. KMD

- 2887 STADELMEIER (M) and BERGNER (KG). The proteins of honey. VI. Isoelectric focusing of different honey amylases. *Z. Lebensmittel Unters Forschung*. 182(1); 1986; 25-8 (German)

Starch

- 2888 BLENFORD (DE). Starches (Part 2). *Food Flavour. Ingrid. Process. Packag.* 8(2); 1986; 11, 16

Briefly discusses modified starches, key properties and functional attributes. BSN

- 2889 RING (SG) and MORRIS (UJ). Useful interactions. *Food Flavour Ingrid. Process. Packag.* 8(2); 1986; 19, 21

A brief discussion on chemical structure, gelatinisation and retrogradation, modifications, possible mechanisms for starch gum interactions and experience with starch-gum mixtures of starch-protein mixtures. BSN

BAKERY PRODUCTS

- 2890 FOOD LAW FORUM. Cereal Chemistry Symposium 1985. Getreide Mehl Brot. 40(1); 1986; 23-9 (German)

Texts of the following 5 papers are presented in this issue. BENEDICKT (G) - Carry-over principle for the labelling of food additives (within the meaning of Arb. 5, Section 2, No.2, of the Food Labelling Order) (p.23-24); BECKER (G) - Rules for bread and rolls (p.25); BRUMMER (J-M) - Labelling of (Trade names) of small baked goods (or rolls) (p.26-28); SEIBEL (W) - Sour dough and the food law (p. 28); STREIT (H) - Detection and evaluation of browning agents in bread and rolls (p. 29). KMD

- 2891 SCHREY (J). Obstructive respiratory tract diseases in the baking trade - Baker's Asthma. Getreide mehl Brot. 40(1); 1986; 21-3 (German)

Over 1000 cases of baker's asthma were reported in Germany in 1984. Reduction of flour dust in the production rooms, and preventive examinations under a programme for control of occupational diseases are the only ways of mastering this problem. It is better to spend money on preventive steps to reduce dust, and to insist on construction of installations which create the minimum of flour dust than to pay pensions to those who are afflicted with the disease. KMD

Bread

- 2892 DREYER (E), SCIDEL (W) and JAHN-DEESBACH (W). Investigations on the interaction of whole wheat meal with fat, sugar, and other recipe components, in the production of whole wheat bread and confectionery specialities. Getreide Mehl Brot. 40(1); 1986; 12-6 (German)

Special types of bread were prepared with whole wheat flour from two wheat varieties - Monopol (of high protein content) and Caribo (of low protein content) - using different baking additives for the two different wheat varieties. Loaves having a loose and attractive crumb structure could be baked from yeast-raised doughs prepared with whole meal flours of both these varieties, but A9 varieties were superior to B-4 varieties when processing. When whole meal flours of Monopol and Caribo wheats were processed into fine baked goods, it became clear that the influence of variety and protein level could be diminished by the addition of fat and sugar. Varietal differences became evident only when the dough was being worked up. Both the A and B varieties may be considered suitable for the production of wholemeal baked goods when their protein content lies in the range of 12-14%. KMD

- 2893 WOOTTON (M) and SHAMS-UD-DIN (M). The effects of aqueous extraction on the performance of wheat bran in bread. J. Sci. Food Agric. 37(4); 1986; 387-90

Wheat bran was separated into bran, bran extract (extraction with tap water) and bran residue. Maximum dough resistance and loaf volume of a white flour were both increased by the addition of the residue. Both these parameters were substantially decreased by bran extract and, to a lesser degree, by the bran itself. Coarse bran had the greatest effect on loaf volume and dough properties. KAR

- 2894 BOLLING (H), GERSTENKORN (P) and WEIPERT (D). Comparative investigations on the processing quality of alternatively and conventionally grown bread grain. Getreide Mehl Brot. 40(2); 1986; 46-51 (German)

The quality of bread grains grown by the conventional methods of agriculture has been compared with that of grains grown by the so-called "biological" or "natural" method. In terms of yield, the con-

ventional method was distinctly superior. The "biologically" grown grain is comparable to the conventionally produced grain in grain formation, hectolitre weight, and flour yield, but it has a lower protein content. KMD

- 2895 BRUMMER (J-M) and STEPHAN (H). Use of dried sour dough and sour dough starter, as well as flour mixes and flour mix concentrates with dried sour dough, for the production of bread and rolls. *Getreide Mehl Brot*. 40(2); 1986; 51-8 (German)

Dried sour dough and, of course, sour dough starter, can be added directly to a dough mix to start fermentation provided the dough has been developed at a sufficiently high temperature for a sufficiently long time. It looks as if dried sour doughs require long reaction time. If the dried sour dough is added to a mixed rye-wheat (70:30) dough, then the bread that is obtained is of good quality, but has a poorer aroma and taste than the normal rye-wheat mixed bread. The organoleptic quality of wheat-rye mixed breads, on the other hand, was good. KMD

- 2896 BJORCK (I), NYMAN (M), PEDERSEN (B), SILJESTROM (M), ASP (N-G) and EGGUM (BO). On the digestibility of starch in wheat bread. Studies in vitro and in vivo. *J. Cereal Sci.* 4(1); 1986; 1-11

The extent of digestion and absorption in vivo was evaluated through balance experiments in rats given test diets with and without addition of the antibiotic, Nebacitin, to reduce the fermentation in the hind-gut. As judged from a high faecal recovery of dietary fibre constituents in rats fed a wheat flour diet with Nebacitin, this drug significantly reduced the microbial activity in the hind-gut. Only minute amounts of starch could be detected in faeces of rats whether Nebacitin was present or not, indicating that pure wheat starch as well as starch in wheat bread and raw wheat flour was almost completely digested and absorbed in the rat small intestine. However, during baking, a fraction of the starch (0.6%-0.9%, dry basis) was rendered resistant to enzyme digestion in vitro unless solubilised in KOH. This modified starch fraction also remained undigested in vivo, but was readily metabolised by the hind-gut microorganisms, thus having physiological properties similar to those of dietary fibre. It is therefore recommended that resistant starch formed during baking (i.e. that rendered resistant to enzymic digestion as measured in vitro) should be regarded as dietary fibre rather than as dietary starch. AA

- 2897 BAKER (AE), DOERRY (WT) and KEMP (K). Graphical presentation of Instron factors on crumb firmness. *Cereal Food World*. 31(3); 1986; 262-3, 265-6, 268

The author recommend that a 25% compression, a 100 mm/mice crosshead speed, and a round plunger with an area of 600-1,150 mm, be meal to measure the crumbs firmness of white pan bread. KAR

- 2898 KAMEL (B) and RASPER (VF). Comparison of precision penetrometer and baker compressimeter in testing bread crumb firmness. *Cereal Food World*. 31(3); 1986; 269-70, 272-4

A constant force penetrometric technique using a precision penetrometer was compared with the constant deformation testing of bread crumb firmness by a Baker compressimeter on breads prepared with four different surfactants (SSL, Atmul P-25, Atmul 500 and DATEM) and stored for 24, 96 and 168 hr at 23 C. Both techniques ranked the surfactants in the same order with respect to their potential in crumb softening and retarding staleness. The penetrometer, however seemed to respond with a greater sensitivity to variations in the measured property. KAR

- 2899 DUVENAGE (E). Measurement of fat and moisture in air-dried bread by near infrared reflectance. *J. Sci. Food Agric.* 37(4); 1986; 384-6
- Near infrared calibrations have been derived and used routinely for a year in the measurement of fat and moisture in air-dried bread. First and second derivative calibrations were obtained using a Pacific Scientific mark II scanning spectrophotometer on samples sent from all over South Africa to the Wheat Board for analysis. Prediction analysis performed on further bread samples gave standard errors of prediction (s.e.p.) of 0.12% fat and 0.13% moisture. AA
- 2900 RABE (E). Methods for the determination of dietary fibre in milled grain products and baked goods. *Getreide Mehl Brot.* 40(1); 1986; 8-12 (German)
- The official, "neutral detergent method" of Robertson and Van Sost, for the estimation of dietary fibre in bread and flour does not always produce results that are satisfactory from the standpoints of repeatability and comparability. The author has, therefore, reported some results obtained by an enzymatic method, for the sake of comparison. A rapid method, using thermostable enzymes, has also been reported. The results obtained by this last method agree very well with those obtained by Thomas's method of dietary fibre estimation. The enzymatic method is recommended for application as a routine method, on account of its reproducibility and speed. KMD
- 2901 DAKROURY (AM), ABD EL GALIL (AM), EL-SAADANY (SC) and DARWISH (AK). Comparative analysis of total proteins, amino acids, carbohydrates, fibers, lipids, macro and micro minerals contents in different types of Egyptian bread. *Nahrung.* 30(1); 1986; 3-9
- Seven types of Egyptian bread were collected from different rural and urban areas. The chemical composition including total proteins, amino acids, carbohydrates, fibers, lipids, macro and micro minerals contents were determined. Total proteins content was higher in shamssy bread than other types of bread. Crude fat has the highest value in bread made from mixture of cereals, especially when trigonella is found, while fiber content was highest when mixture of cereals containing sorghum is used. Ash content of bread made from maize + wheat showed a higher value than other types and the differences were highly significant. Ca, Mg, Cu, and Fe were higher in bread made from sorghum + trigonella blend than other types of bread. Variations in the amino acids content of the different types of breads were found; these differences were due to the origin of different cereals, the method of bread processing and the differences in the extraction rates of the flour. AA
- 2902 PARAMASIVAN (P) and INDIRA KALYAANASUNDARAM. Sources of fungal contamination of bread. *J. Food Sci. Technol. (India)* 23(3); 1980; 135-9
- The possible contamination of bread in 3 bakeries was investigated by observing the flour, water, sugar, vegetable fat used for bread making and the air samples of the bakery. In all the three bakeries, the number of colonies ranged from 3300 to 4200/g in flour, 1400 to 4700/g in fat, 1500 to 2000/g in sugar and 10 to 20 colonies/ml in water. The most common sp., were *Aspergillus candidus* and *Asp. amstelodami*, and *Asp. flavus* in flour; *Asp. versicolor* and *Paecilomyces variotii* in vegetable fat and *Asp. flavus*, *A. amstelodami* and *Penicillium* sp. in sugar. The contamination was much reduced after baking, but not totally eliminated. In baked bread, *mucor* was most common followed by *Asp. amstelodami* and *Asp. niger*. When the bread loaves were taken out of the oven and left to cool in the open air, the contamination increased from 8.5 to 42% after 1 hour, the number of propagules ranging from 1100 to 1300/g. The bread sold at the bakery was contaminated with 1700 to 2400 fungi/g. and those stored in the shop showed contamination of 42 to 47% (1200 to 1500

fungi/g) after 2 days, 55% (1500 to 1700 fungi/g) after 4 days, beyond which there was a levelling off. The moisture decreased from 27 to 17.5% during 6 days of storage in the shop. In bread, the fungi were higher at the surface than in the interior, but the difference was more pronounced in bread left in the open. In sliced bread, the fungi were higher in the interior also. The gunny bags used for collecting the loaves from the oven showed maximum contamination. Newspaper used for wrapping had 130 to 190 colonies/cm². The air within the bakery was more heavily laden with fungi than the air outside, while that in the shop had the highest numbers. KAR

- 2903 SIMONS (LA), STONE (PL) and SIMONS (J). The use of bread in diets for weight reduction. *Food Technol. Aust.* 38(2); 1986; 68-70

This study demonstrates that weight loss and a fall in blood pressure and plasma lipids can occur with the nutritionally adequate, energy controlled diet containing six sandwich slices of bread daily. KAR

Doughs

- 2904 PFEILSTICKER (K) and MARX (F). An investigation into the reaction kinetics of L-ascorbic acid and L-dehydro-ascorbic acid in wheat flour doughs using a gas-chromatographic/mass-spectrometric method. *Z. Lebensmittel-Unters. Forschung.* 182(3); 1986; 191-5 (German)

The authors have confirmed recently reported findings on the kinetics of oxidation of L-AA and L-DAA in doughs having added L-AA. The loss of total ascorbic acid (L-AA + L-DAA) was approximately 30% after dough making. When L-DAA was added, the only a small quantity of L-AA was formed, and the loss of total ascorbic acid was 70%. It is concluded that at least some part of the L-AA/L-DAA does not react like a redox system, but that L-DAA forms intermolecular condensation products with the amino groups of proteins. These may contribute to improved baking quality. KMD

- 2905 JACKSON (GM) and HOSENEY (RC). Effect of endogenous phenolic acids on the mixing properties of wheat flour doughs. *J. Cereal Sci.* 4(1); 1986; 79-85

An interchange experiment showed that it was the gluten/starch fraction of flour and not the level of ferulic acid that controlled rapid breakdown of overmixed doughs. This finding also explains why a large amount of exogenous ferulic acid is needed to cause rapid breakdown. Quantitative analysis of the phenolic acids in wheat flour and doughs showed ferulic acid to be the predominant phenolic acid. During overmixing of wheat flour doughs, ferulic acid was lost from those fractions that initiated breakdown in gluten/starch doughs. As wheat flour dough was overmixed, the concentration of ferulic acid in the free form decreased from 1.0 to 0.3 mg/kg and in the soluble, bound form from 3.8 to 0.9 mg/kg. Ferulic acid in the insoluble, bound form did not decrease in concentration, remaining at about 36 mg/kg. These data are in agreement with the theory that ferulic acid in the water-soluble fraction of wheat flour interacts with the gluten/starch fraction to bring about rapid dough breakdown. AA

- 2906 JACKSON (GM) and HOSENEY (RC). Fate of ferulic acid in overmixed wheat flour doughs. Partial characterization of a cysteine-ferulic acid adduct. *J. Cereal Sci.* 4(1); 1986; 87-95

- 2907 SPICHER (G). Evaluation of sourdough starter cultures, sourdoughs in dry form, and sourdough-holding ready-made flours and flour concentrates by means of micro-biological indices. Part 3. Sourdough holding ready-made flours and flour concentrates. *Dtsch. Lebensmittel Rundschau.* 82(2); 1986; 39-42 (German)

Noodles

- 2908 RHO (KL), SEIB (PA), CHUNG (OK) and CHUNG (DS). Retardation of rancidity in deep-fried instant noodles (Ramyon). *J. Am. Oil Chem. Soc.* 63(2): 1986; 251-6

The storage stability of instant fried noodles (ramyon) was determined by accelerated aging at 63 C with organoleptic evaluation of the onset of rancidity. Three methods of extending the shelf-life of ramyon were examined: (a) addition of 200 ppm antioxidant, butylated hydroxyanisole (BHA), t-butylhydroquinone (TBHQ), or a polymeric antioxidant (Poly-A) to the frying (palm) oil; (b) coating the inner surface of the polyethylene package with TBHQ equivalent to 200, 500 and 1000 ppm based on the oil in the ramyon; and (c) addition of a mixture of 200 ppm TBHQ and 200 or 500 ppm disodium ethylenediaminetetraacetate (EDTA) to the frying oil. When the antioxidants were added to the oil, BHA and Poly-A approximately doubled while TBHQ tripled the shelf-life of ramyon. The mixture of TBHQ (200 ppm) and disodium EDTA (500 ppm) in the frying oil quintupled the shelf-life. The inner surface application of TBHQ (200 ppm) extended shelf life twice that of an equal amount of TBHQ in the frying oil. Rancid off-flavours developed slowest in noodles with a_w 0.3. Hexanal concentration in ramyon was a good indicator of the development of oxidative rancidity. Organoleptic evaluation showed the flavour of ramyon was objectionable when hexanal concentration reached 3.5 ppm based on the weight of ramyon (as is). The relative effectiveness of antioxidants in preventing off-flavour in ramyon could be determined from the hexanal concentration in stored ramyon. AA

Snack

- 2909 BLENFORD (DE). Snack food 1985. (Part I), Review. *Food Flavour Ingrid. Process. Packag.* 8(1); 1986; 24-25, 27, 29
Discusses: The USA; new markets for snacks; Spain; non-European snack sources; savoury/extruded snacks; coated snacks; and snack bars. BSN
- 2910 BLENFORD (DE). Snack food 1985 (Part II). Review. *Food Flavour Ingrid. Process. Packag.* 8(2); 1986; 36-7
Discusses briefly the novel snacks and their packaging, new opportunities and the future. BSN

MILK AND DAIRY PRODUCTS

- 2911 POELMA (PL), WILSON (CR) and ANDREWS (WH). Influence of sample reconstitution on recovery of *Salmonella* species from low-moisture dairy foods. *J. Food Prot.* 49(2); 1986; 121-5
Recovery of *Salmonella* species from dry whole milk, lactic casein, non-instantized nonfat dry milk, rennet casein and sodium caseinate was compared under rapid and slow conditions of rehydration. For rapid rehydration, a 25-g portion of each product was blended or swirled with 225 ml of appropriate preenrichment medium. After 60 minutes the flask contents were adjusted to pH 6.0 and incubated at 35 C. For slow rehydration, a 25-g portion of each product was gently added to 225 ml of appropriate pre-enrichment medium, allowed to soak undisturbed for 60 minutes at room temperature, and then incubated at 35 C without pH adjustment. Recovery of *Salmonella* by the slow rehydration (soak) method was equal or enhanced for all products tested except sodium caseinate. Use of a meter instead of test paper to adjust the pH of rapid rehydration (blend/swirl) preenrichments did not improve recovery of *Salmonella*. Examination of dry whole milk and

non-instantized nonfat dry milk by the soak method should be limited to 25-g amounts since 100-g and 375-g composites were not completely wetted. Composites of lactic and rennet casein weighing <375 g, however, may be examined by the soak method without loss of analytical sensitivity. AA

Milk

- 2912 KIRST (E) and MEYER (A). Lipolytic processes in milk and dairy products. Part 6. Researches on the influence of lipolytic changes in milk fat, on the quality of milk and dairy products. *Lebensmittelindustrie*. 33(1); 1986; 34-7 (German)
The authors have reviewed the progress of lipolytic changes that occur in milk, and the factors that influence these changes. A detailed description has been given of the formation of free fat and free fatty acids in milk and of their influence on the quality of milk and milk products. Other points that have been covered are: (i) influence of lipolytic changes on the separability of milk fat; (ii) influence of homogenization of the concentrate on the lipolytic coefficients and sensory quality of milk powder; (iii) influence of cooling whipped cream on the changes in the free fat content of cream during whipping; and (iv) the increase in volume obtained thereby. KMD
- 2913 DESCAMPS (O), LANGEVIN (P) and COMBS (DH). Physical effect of starch/carrageenan interactions in water and milk. *Food Technol.* 40(4); 1986; 81-6. 88
The study was undertaken to examine the interactions between starch and carrageenan in water and in fresh milk through evaluation of viscosity measurements. The results were used to manufacture ultra-high temperature treated dairy desserts and low-starch-content pudding formulations. KAR
- 2914 JOHNSON (AG). Control of inhibitory substances in milk. Varfoda. 38(3-4); 1986; 263-8
- 2915 WOLFSCHOON-POMBO (AF) and KLOSTERMEYER (H). Indoxysulphate in milk. *Z. Lebensmittel-Unters Forschung*. 182(2); 1986; 103-6
- 2916 LEDL (F), ELLRICH (G) and KLOSTERMEYER (H). Detection and identification of a new Maillard compound in heated milk. *Z. Lebensmittel Unters Forschung*. 182(1); 1986; 19-24 (German)
- 2917 DALGLEISH (DG). Analysis of fast protein liquid chromatography of variants of k-casein and their relevance to micellar structure and renneting. *J. Dairy Res.* 53(1); 1986; 43-51
- 2918 AOKI (T), KAKO (Y) and IMAMURA (T). Separation of casein aggregates cross-linked by colloidal calcium phosphate from bovine casein micelles by high performance gel chromatography in the presence of urea. *J. Dairy Res.* 53(1); 1986; 53-9
- 2919 SKUDDER (PJ), BROOKER (BE), BONSEY (AD) and ALVAREZ GUERRERO (NR). Effect of pH on the formation of deposit from milk on heated surfaces during ultra high temperature processing. *J. Dairy Res.* 53(1); 1986; 75-87
- 2920 MARSHALL (RJ). Effects of iodate, hydrogen peroxide and dichromate on the denaturation of whey proteins in heated milk. *J. Dairy Res.* 53(1); 1986; 89-95
- 2921 SAMPLES (DR), DILL (SL), RICHTER (RL) and DILL (CW). Relationship of somatic cell count and total sulphydryls in milk. *J. Food Prot.*

49(2); 1986; 110-11

Individual milk samples from 32 cows were analyzed to determine the relationship between somatic cell concentration and total sulphhydryl concentration (cysteine plus reduced cystine). A significant relationship was detected between somatic cell count, which ranged from 1.7×10^4 to 1.0×10^7 cells/ml, and total sulphhydryls/g of milk protein. The regression equation, total sulphhydryls/g of milk protein = $31.96 + 7.99 (\log_{10} \text{ somatic cell count})$ with $r^2 = 0.19$ was calculated. The mean total sulphhydryl concentration was 73.1 $\mu\text{mol/g}$ of protein. The minimal effect of somatic cell concentration on total sulphhydryl concentration indicates that somatic cell concentration should have little influence on chemical parameters of milk protein determined by sulphhydryl analysis when proper experimental controls are used. AA

- 2922 FORD (GD) and GRANDISON (AS). Effect of size of casein micelles on coagulation properties of skim milk. *J. Dairy Res.* 53(1); 1986; 129-33

- 2923 ANUPAM ARORA and SUDARSANAM (TS). Microbiological quality of milk and spray dried skim milk powder used as ice cream ingredients in Karnal. *J. Food Sci. Technol. (India)* 23(3); 1986; 170-72

Milk and spray dried milk powder collected from experimental dairy of the National Dairy Research Institute, Karnal (India) (Source A) and from the market (Source B) were analysed for total bacterial count, acid formers, proteolytic, chromogenic, Gram negative, coliforms, yeast and molds, Psychrotrophs, Staphylococci, and spore counts. None of the samples from both the sources contained standard plate count of $> 30,000/\text{ml}$. Source A milk contained Gram negative organisms and coliforms even after pasteurization indicating post-pasteurization contamination. Skim milk powder contained 160 to 6300/g of spore formers. KAR

- 2924 COLEMAN (WW). Antibiotics in my milk? *Dairy Food Sanit.* 6(2); 1986; 48-50

Discusses: The producer; bulk hauler; and receiving and testing facilities. BSN

- 2925 SWANSON (SP), DAHLEM (AM), ROOD (HD), Jr., COTE (L-M), BUCK (WB) and YOSHIZAWA (T). Gas chromatographic analysis of milk for deoxynivalenol and its metabolite DOM-1. *J. Assoc. Off. Anal. Chem.* 69(1); 1986; 41-6

A gas chromatographic method is described for the determination of deoxynivalenol (DON) and its metabolite DOM-1 in milk. Milk samples were extracted with ethyl acetate on a commercially available disposable extraction column, followed by hexane-acetonitrile partitioning. Final purification was accomplished on a reverse phase C-18 cartridge. The trimethylsilyl ether (TMS) derivatives of DON were prepared, chromatographed on an OV-17 column, and quantitated with an electron capture detector. Chromatography of the TMS derivatives of milk extracts was compared to that of the corresponding heptafluorobutyl derivatives. The limit of detection using TMS derivatives was 1 ng/mL for both toxins with recoveries averaging $82\% \pm 9\%$ at 2.5 and 10 ng/mL milk for DON and $85\% \pm 6\%$ at 10 ng/mL for DOM-1. AA

- 2926 NORDLANDER (I), OSTERDAHL (D G) and JOHNSON (AH). Levamisole residues in milk. *Varfoda.* 38(3-4); 1986; 267-75 (Swedish)

Cheeses

- 2927 HUTKINS (R), HALAMBECK (SM) and MORRIS (HA). Use of galactose-fermenting *Streptococcus thermophilus* in the manufacture of

Swiss, Mozzarella, and short-method cheddar cheese. J. Dairy Sci. 69(1); 1986; 1-8

- 2928 DEMOTT (BJ), HITCHCOCK (JP) and DAVIDSON (PM). Use of sodium substitutes in cottage cheese and buttermilk. J. Food Prot. 49(2); 1986; 117-20

Twenty-four market samples of cottage cheese had an average sodium concentration of 4.71 ± 1.20 mg/g. Two samples of cottage cheese formulated to contain 1.1% "Lite" and Z yeast, and having sodium concentrations of 3.23 and 2.54 mg/g had significantly lower flavour scores than a sample containing 1.4% NaCl and having 6.25 mg of Na/g. The Standard Plate Counts and the yeast and mold counts on the cottage cheese after storing 10 days at 4°C were not different between samples containing salt, salt substitute or salt substitute plus a dry yeast preparation. Psychrotrophic bacteria were more numerous in the samples containing the yeast preparation. Four samples of buttermilk containing 0.015% "Z yeast 45-F" and 0.25% NaCl, 0.25% "Lite" and 0.015% "Z yeast 45-F", 0.25% NaCl, or 25% "Lite" had comparable flavour scores. The sodium concentrations of the four samples were 1.094, 0.793, 1.125 and 0.771 mg/g, respectively. The growth of yeasts and molds in samples containing "Z yeast 45-F" and "Lite" was slightly but not significantly greater than the other three samples. Psychrotrophic counts on buttermilk after 7 days of storage at 4°C were much lower than the original counts, but were not influenced by the additives used. AA

- 2929 AKYUZ (N). Effect of starter usage and packaging with paraffin on the volatile fatty acids content and flavour quality of Kasher cheese. Z. Lebensmittel-Unters Forsch. 182(2); 1986; 107-111

In this study, 54 samples of Kasher cheese - a Turkish cheese - were analyzed. Some of the samples were made from pasteurized and cultured cow-milk. One group of samples was completely coated within paraffin, while a second group was not coated after the salting stage. At the end of the ripening period, the volatile fatty acids content of all the samples was determined by gas chromatography. The effect of starters on the volatile fatty acid contents was found to highly significant statistically. It is recommended that a starter culture should be used, and each unit should be coated with paraffin to produce a Kasher cheese of high flavour-quality. KMD

Curd

- 2930 JABLONKA (MS) and MUNRO (PA). Development of an objective method for assessing the mechanical strength of casein curd. J. Dairy Res. 53(1); 1986; 61-8

- 2931 JABLONKA (MS) and MUNRO (PA). Effect of precipitation temperature and pH on the mechanical strength of batch precipitated acid casein curd. J. Dairy Res. 53(1); 1986; 69-73

Khoa

- 2932 VARADARAJ (MC) and NAMUDRIPAD (VKN). Growth of *Staphylococcus aureus* in khoa. J. Food Sci. Technol. (India) 23(3); 1986; 139-43

The growth of *Staphylococcus aureus* inoculated into khoa (an Indian milk product) prepared with 3 levels of moisture (26-28, 38-42 and 45-48%) and stored at room temperature (25-35°C), and under refrigeration (4-5°C) for 2 days was studied. Strains of *Staph. aureus* inoculated at 1×10^3 CFU/g of khoa, grew well reaching 10^{12} CFU/g in 48 hours at room temperature, while the strains failed to grow in khoa under refrigeration. The moisture levels did not show any significant effect on staphylococcal growth. Microtome section of khoa revealed the occurrence of staphylococcal clusters which gradually increased in

size as the storage period progressed from 24 to 72 hours, ultimately resulting in large clumps of cells. Strains of *Staph. aureus* grown in brain heart infusion and nutrient broths added with autoclaved solutions of casein and lactose showed the presence of staphylococcal clusters each formed of a large number of cells, similar to the one observed in microtome sections of khoa. AA

Wheys

- 2933 DUMAY (E) and CHEFTEL (JC). Emulsifying properties of whey protein concentrates. Correlations between different methods of evaluation. *Sci. Aliment.* 6(2); 1986; 147-76 (French)

MEAT AND POULTRY

Meat

- 2934 GENIGEORGIS (C). Problems associated with perishable processed meats. *Food Technol.* 40(4); 1986; 140-54
This article reviews the recent public health record of perishable processed meats and the foodborne diseases associated with them. KAR
- 2935 ELLEN (G), EGMOND (E) and SAHERTIAN (ET). N-nitrosamines and residual nitrite in cured meats from the Dutch market. *Z. Lebensmittel-Unters Forschung.* 182(1); 1986; 14-8
A total of 140 samples of 16 kinds of cured meats were analyzed for their content of residual nitrite and N-nitrosamines. No nitrite was detected ($< 1 \text{ mg NaNO}_2/\text{kg}$) in 6 samples; The NaNO_2 content in the remaining samples ranged from 1 to 140 mg/kg, the median value being 6.8 mg/kg. No nitrosamines were detected in 46 samples, i.e. the amount was less than 0.1-0.5 $\mu\text{g}/\text{kg}$. N-nitrosodimethylamine (NDMA) was the compound most frequently present (in 75 samples); range 0.1-0.9 $\mu\text{g}/\text{kg}$, mean 0.3 $\mu\text{g}/\text{kg}$. Other nitrosamines present were: N-nitrosopiperidine (NPiP); found 10 times, 0.3-25 $\mu\text{g}/\text{kg}$; N-nitrosopyrrolidine (NPYR); 3 times, 1.3-4.2 $\mu\text{g}/\text{kg}$; N-nitrosodiethylamine (NDEA); 3 times, 0.2-0.9 $\mu\text{g}/\text{kg}$; N-nitrosomorpholine; once, 0.7 $\mu\text{g}/\text{kg}$; and N-nitrosothiazolidine (NTHZ); 36 times, 0.5-91 $\mu\text{g}/\text{kg}$, mean 5.7 $\mu\text{g}/\text{kg}$. NTHZ was found most often, and at the highest levels, in smoked products. Frying led to substantial increases in the level of NPYR in bacon and smoked pork bellies, and also of NTHZ in pork bellies. After frying, the NTHZ levels increased to 3.6-490 $\mu\text{g}/\text{kg}$ (mean 179 $\mu\text{g}/\text{kg}$). No correlation could be established between residual nitrite levels and N-nitrosamine contents. Values obtained during the 1970s were much higher than those reported above. KMD
- 2936 SERUM (DK), FIELD (RA) and MILLER (GJ). Contribution of bone marrow to the vitamin content of mechanically separated meat. *Meat Sci.* 17(1); 1986; 73-7
Vitamin A and C content of red marrow from vertebrae of good and choice grade steers was determined so that the nutritional contribution of marrow to mechanically separated meat (MSM) could be more fully defined. Vitamin A and C for marrow were higher than those reported for muscle, but the slightly higher levels in MSM than in hand boned meat are nutritionally insignificant. AA
- 2937 THAYER (DW), LACHICA (RV), HUHTANEN (CN) and WIERBICKI (E). Use of irradiation to ensure the microbiological safety of processed meats. *Food Technol.* 40(4); 1986; 159-62

Covers aspects like determination of D values, effect of cryogenic temperature and NaCl on meat irradiation, and along with examples of some irradiated products like bacon, ham, frankfurters, corned beef and pork sausage and beef, chicken and pork. KAR

- 2938 ROBERTS (TA) and GIBSON (AM). Chemical methods for controlling *Clostridium botulinum* in processed meats. *Food Technol.* 40(4); 1986; 163-71, 176
- 2939 RUTEGARD (AA) and KIHLEBERG (C). Control of residues of antibiotics and chemotherapeutic agents in meat. *Varfoda.* 38(3-4); 1986; 256-262
- 2940 FAGERLUND (B). Drug residues in meat, milk and eggs. *Varfoda.* 38(3-4); 1986; 211-23
- 2941 KUIVINEN (J) and SLANINA (P). Effect of cooking on ivermectin residues in meat. *Varfoda.* 38(3-4); 1986; 280-84
- 2942 OSTERDAHL (B-G) and JOHNSON (H). Analysis of diethylstilbestrol in meat. *Varfoda.* 38(3-4); 1986; 276-9 (Swedish)

Beef

- 2943 HUDSON (WR), ROBERTS (TA), CROSLAND (AR) and CASEY (JC). The bacteriological quality, fat and collagen content of minced beef at retail level. *Meat Sci.* 17(2); 1986; 139-52

- 2944 GREER (GG). Homologous bacteriophage control of *Pseudomonas* growth and beef spoilage. *J. Food Prot.* 49(2); 1986; 104-6

The effects of homologous bacteriophages upon growth of a beef spoilage pseudomonad and the retail case life of beef were examined under conditions of simulated retail display. Initial studies with an aqueous extract of beef muscle showed *Pseudomonas* growth was significantly limited by phages for upto 3 days at 7 C. Subsequently, it was shown that the treatment of *Pseudomonas*-inoculated steaks with high titer phage lysates (10^8 PFU/ml) resulted in a 1- to 2-log reduction in the level of bacterial contamination and a 2-log increase in phage numbers after 4 days of retail display. These changes were accompanied by a marked decrease in steak surface discolouration and a concurrent improvement in retail acceptance. Steak case life was positively correlated with phage concentration within the range of 10^4 to 10^8 PFU/ml. At the highest concentration of phages tested (10^8 PFU/ml) steak case life was significantly increased from 1.6 to 2.9 days. It was concluded that phages could multiply on the steak surface and have the potential for the biological control of beef spoilage. AA

- 2945 WANG (SY), DOCKERTY (TR), LEDFORD (RA) and STOFFER (JR). Shelf-life extension of vacuum packaged frankfurters made from beef inoculated with *Streptococcus lactis*. *J. Food Prot.* 49(2); 1986; 130-34, 141

Fresh beef, containing 0.5% dextrose, was inoculated with *Streptococcus lactis*, incubated for 3, 5 and 7 days at 7 ± 1 C, and then used to manufacture frankfurters. The frankfurters were vacuum-packaged and stored for 1, 2, 4 and 6 weeks at 3 ± 1 C. Microbial quality was evaluated by examining frankfurters for aerobic and psychrotrophic counts at the end of each storage period. The level of nisin, an antibiotic substance produced by this strain of *S. lactis*, was also monitored in fresh meat and processed products. During the incubation period, no appreciable reduction in pH occurred in fresh meat, but of psychrotrophs was slower in treated than untreated fresh meat, but whether this was due to presence of nisin or competition resulting from the heavy inoculation with *S. lactis* is unclear. Before and after processing, nisin levels in the 5- and 7-days incubation-treated groups

were higher than in the 3-days group, and all treated groups had higher nisin levels than untreated groups. Little difference in aerobic and psychrotrophic growth was noted with storage time between treated and untreated groups for the 3-day incubation period, but well defined differences were noted in the 5- and 7-days incubation groups, with aerobic growth in treated groups being significantly slowed through the 6-week storage period, and psychrotrophs being 1 to 1.5 log cycles lower at the 6-week evaluation. The growth patterns suggest that nisin played a role in the reduced growth rate of bacteria in treated groups. AA

Bulls

- 2946 UNRUH (JA), GRAY (DG) and DIKEMAN (ME). Implanting young bulls with zeranol from birth to four slaughter ages: II. Carcass quality, palatability and muscle-collagen characteristics. *J. Anim. Sci.* 62(2); 1986; 388-98
- 2947 JOHNSON (RC), GEE (DH), COSTELLO (WJ) and CARLSON (CW). Effects of anabolic implants and breed group on carcass traits and palatability characteristics of bullock beef. *J. Anim. Sci.* 62(2); 1986; 399-406

Cattle

- 2948 KEMPSTER (AJ), COOK (GL) and GRANTLEY-SMITH (M). National estimates of the body composition of British cattle, sheep and pigs with special reference to trends in fatness. A review. *Meat Sci.* 17(2); 1986; 107-38
- 2949 TATUM (JD), WILLIAMS (FL) Jr., and BOWLING (RA). Effects of feeder-cattle frame size and muscle thickness on subsequent growth and carcass development. I. An objective analysis of frame size and muscle thickness. *J. Anim. Sci.* 62(1); 1986; 109-20
- 2950 TATUM (JD), DOLEZAL (HG), WILLIAMS (FL) Jr., BOWLING (RA) and TAYLOR (RE). Effects of feeder-cattle frame size and muscle thickness on subsequent growth and carcass development. II. Absolute growth and associated changes in carcass composition. *J. Anim. Sci.* 62(1); 1986; 121-31
- 2951 TATUM (JD), WILLIAMS (FL) Jr., and BOWLING (RA). Effects of feeder-cattle frame size and muscle thickness on subsequent growth and carcass development. III. Partitioning of separable carcass fat. *J. Anim. Sci.* 62(1); 1986; 132-8

Bovines

- 2952 GONCALVES (M-P) and BOURGEOIS (CM). The precipitation of bovine blood plasma proteins by anionic polysaccharides. I. Study of the precipitation conditions. *Sci. Aliment.* 6(2); 1986; 137-45
- 2953 SEIDEMAN (SC) and CROUSE (JD). The effects of sex condition, genotype and diet on bovine muscle fiber characteristics. *Meat Sci.* 17(1); 1986; 55-72
- 2954 SEIDEMAN (SC), CROUSE (JD) and CROSS (HR). The effect of sex condition and growth implants on bovine muscle fiber characteristics. *Meat Sci.* 17(2); 1986; 79-95
- 2955 BURSON (DE) and HUNT (MC). Heat-induced changes in the proportion of types I and III collagen in bovine *Longissimus dorsi*. *Meat Sci.* 17(2); 1986; 153-60

Steers

- 2956 BIDNER (TD), SCHUPP (AR), MOHAMAD (AB), RUMORE (NC), MONTGOMERY (RE), BAGLEY (CP) and McMILLIN (KW). Acceptability of beef from angus-hereford or angus-hereford-brahman steers finished on all-forage or a high-energy diet. *J. Anim. Sci.* 62(2); 1986; 381-7

Lambs

- 2957 SOLOMON (MB), LYNCH (GP) and BERRY (BW). Influence of animal diet and carcass electrical stimulation on the quality of meat from youthful ram lambs. *J. Anim. Sci.* 62(1); 1986; 139-46
- 2958 ADINARAYANA (Y), REDDY (KS), PRABHAKAR (K), CHARYULU (EK) and REDDY (PM). Carcass characteristics among native and cross-bred feeder lambs. II. Study of breed differences and prediction of total fat in the carcass and meat tenderness. *Indian Vet. J.* 63(1); 1986; 54-8

- 2959 SANKARAN (R), MURALI (HS), LEELA (RK) and SHARMA (TR). Enhancement of colour and texture of mutton by the use of lactic acid bacteria. *J. Food Sci. Technol. (India)* 23(3); 1986; 172-5

Muscle (*Longissimus dorsi*) from hindlegs of Bannur lamb was smeared with *Lactobacillus bulgaricus* and *Streptococcus lactis* cultures singly and in combination (1:1) and also with *Lact. plantarum* singly or in combination with *Strep. lactis* (1:1). Muscle was stored at 5 C under 90-98% RH for 6 days. Myoglobin % was lower in untreated samples than in treated muscle. Texture of the treated muscle also improved. The texturometer values for *L. bulgaricus* and *Strep. lactis* were 5.93 and 7.40 units/volt respectively, whereas the values for the samples treated with the mixture was 7.11 units/volt., while the corresponding values for the control were 4.47, 6.83 and 6.47 units/volt respectively. The pH of treated muscle dropped during the first 3 days of storage and remained constant afterwards. KAR

Pork

- 2960 SWATLAND (HJ). Post-mortem spectrophotometry of pork and beef using quartz optical fibres. *Meat Sci.* 17(2); 1986; 97-106

Bacon

- 2961 KEMPSTER (AJ) and MONK (AS). Relationships between bacon grade schedules and carcass characteristics. *Meat Sci.* 17(1); 1986; 1-23

- 2962 HUHTANEN (CN), SHIEH (J), WIERBICKI (E), ZAIKA (L), JENKINS (RK), BUCHANAN (RL) and THAYER (DW). Effect of sugar and low-dose irradiation on toxin production by *Clostridium botulinum* in comminuted bacon. *J. Food Prot.* 49(2); 1986; 112-6

Comminuted bacon, processed to contain target levels of 40 µg NaNO_2/g . and 0, 0.25 or 0.75% sucrose or 0.75% glucose, was inoculated with a mixture of spores of 20 strains of *Clostridium botulinum*. (400 spores per g) and was canned under vacuum. Portions were irradiated using ^{137}Cs at doses of 0, 0.19, 0.38, 0.75, 1.12 and 1.5 Mrad. Cans were incubated for 1, 2, 4 or 8 weeks at 30°C. Some cans of nonirradiated bacon without or with 0.25% sucrose became toxic in 2 weeks with 0.75% sucrose, toxin production was delayed to 8 weeks. Bacon irradiated at 0.75 Mrad, made with or without sucrose, became toxic in 2 to 4 weeks, whereas most cans of bacon irradiated at 1.5 Mrad remained toxin-free for the 8 week incubation period. A comparison of the sugars in the rates of toxin production by *C. botulinum* in irradiated cans of bacon. Irradiation at 0.19 Mrad increased the rate of

toxin formation over nonirradiated bacon in sugar-containing (0.75%) bacon, but had no effect in sugar-free bacon. The pH of nonirradiated bacon containing 0.75% glucose or sucrose decreased from pH 6.12 and 6.11, respectively, to pH 5.63 and 5.67 after 8 weeks of incubation at 30°C. The titratable acidity showed a concurrent increase. The pH and titratable acidity of bacon irradiated at 0.19 Mrad or higher showed no changes. AA

Offals

- 2963 AREAS (JAG) and LAWRIE (RA). Scanning calorimetric studies on offal protein isolates. *Meat Sci.* 17(1); 1986; 25-35

Eggs

- 2964 KROLL (J) and GASSMANN (B). Manufacture of egg white substitute materials based on mechanolysis and ultrafiltration. *Nahrung.* 30(1); 1986; 93-6 (German)

- 2965 CLARK (AG) and BUESCHKENS (DH). Survival and growth of *Campylobacter jejuni* in egg yolk. *J. Food Prot.* 49(2); 1986; 135-41

Campylobacter jejuni will grow in egg yolk and in yolk-albumen melanges reaching populations in excess of 10^8 CFU/ml. Albumen alone is highly toxic, with D_{10} values of 2.4 hours in vitro at 42°C. Exposure to albumen in vitro is not reversed by later exposure to yolk; rather a substrate accelerated death effect is seen in the presence of added yolk. *C. jejuni* was generally more sensitive to gelatinous albumen than to less viscous albumen, although both forms of albumen inhibited motility after 6 hours of incubation at 42°C. Sensitivity to albumen was only partially due to the individual effects of pH or lysozyme. The major factor in the sensitivity of *C. jejuni* to egg white was the conalbumin as demonstrated by in vitro culture. AA

SEAFOODS

Fish

- 2966 FRENTZEL (W) and WAGENKNECHT (W). Efficient plant for the manufacture of canned small pieces. *Lebensmittelindustrie.* 33(1); 1986; 38-42 (German)

An efficient plant has been designed for slicing fish transversally, and packing the slices vertically into cans along with oil. The raw material input per tonne of finished product was almost halved. The types of fish that have been packed are clupeids - mackerels, sardines, herring. The operational characteristics of the plant have been described in some detail. KMD

- 2967 BON (J), BRUNNER (KK) and AITKEN (A). Determination of fish core content in coated products: Interlaboratory WEFTA studies of three procedures. *J. Assoc. Off. Anal. Chem.* 69(1); 1986; 75-9

- 2968 WATANABE (E), ENDO (H), TAKEUCHI (N), HAYASHI (T) and TOYAMA (K). Determination of fish freshness with a multielectrode enzyme sensory system. *Bull. Jpn. Soc. Sci. Fish.* 52(3); 1986; 489-75

A multielectrode enzyme sensor system was applied to determine the freshness indicator $K_1 = (CHxR + Hx) / (1MP + HxR + Hx) \times 100$ in some fish and the display of freshness pattern was studied by a computer. Moreover, the exudate obtained by the heat and press-treatment of the fish muscle was examined to determine the freshness of the fish. KAR

969 EL-BEDAWAY (AEI-F), ZEIN (GN), EL-SHERBINEY (AM) and DAWOUD (FMA). Effect of supplementatin with fish protein concentrate on protein and amino acid content of salt biscuit. *Nahrung*. 30(1); 1986; 19-24

970 LUNDBORG (LE). Food hygienic aspects of fish and shellfish farming. *Varfoda*. 38(3-4); 1986; 239-48

971 GOULDING (I). Marketing a kettle of fish. *Food Flavour Ingred. Proc-ess. Packag.* 8(1); 1986; 16-17,19

Discusses briefly new challenges and surimi technology involved in processing fish for human consumption. BSN

Cod

2972 FALANDYSZ (J). Trace metals in cod from the Southern Baltic, 1983. *Z. Lebensmittel-Unters. Forsch.* 182(3); 1986; 228-31

Heavy metal contamination in 201 cod fishes (*Gadus morhua*) caught in different regions of the Southern Baltic Sea in 1983 was measured by atomic absorption spectrophotometry. The mean values obtained (in relation to wet weight) were: Cd 0.005, Pb 0.086, Cu 0.15, Zn 3.9, Fe 3.7, Mn 0.21, and Ni 0.081 mg/kg of cod muscle tissue. KMD

2973 FALANDYSZ (J). Organochlorine pesticides and polychlorinated biphenyls in cod from the Southern Baltic, 1983. *Z. Lebensmittel-Unters. Forsch.* 182(2); 1986; 136-9

Pesticide residues in the muscle tissue of 207 cod fishes (*Gadus morhua*), netted in the Southern Baltic Sea in 1983, were as follows: HCB, 0.65; α -BHC 1.2; β -BHC 9.0; γ -BHC 2.8; δ -BHC-undetected; ϵ -BHC 13; p,p'-DDE 4.4; o,p'-DDD and o,p'-DDT remained undetected; p,p'-DDD 4.4; DDT 1.8; ϵ -DDT 10; PCBs 55 μ g/kg wet weight. These results have been compared with the findings of earlier years. KMD

2974 FALANDYSZ (J). Organochlorine pesticides and polychlorinated biphenyls in livers of cod from the Southern Baltic. 1983. *Z. Lebensmittel-Unters. Forsch.* 182(3); 1986; 224-7

Pesticide residues in the livers of 210 cod fish, caught in the Southern Baltic Sea in 1983 were measured and found to be: HCB 0.096; α -BHC 0.15; β -BHC-traces; γ -BHC 0.098; δ -BHC undetected; ϵ -BHC 0.26; p,p'-DD 1.1; o,p'-DDE and o,p'-DDT were undetected; p,p'-DDD 1.1; p,p'-DDT 0.39; DDT 2.6; and PCB 7.2 mg/kg wet weight. KMD

Herring

2975 FALANDYSZ (J). Trace metals in herring from the Southern Baltic, 1983. *Z. Lebensmittel-Unters. Forschung.* 182(1); 1986; 36-9

Heavy metal concentrations in the muscle tissue of 187 herrings (*Clupea harengus*), caught in different parts of the Southern Baltic Sea in 1983 were measured by atomic absorption spectrophotometry. The mean values obtained are: Cd 0.009, Pb 0.079, Cu 0.49, Zn 9.2; Fe 9.9, Mn 0.19, and Ni 0.01 mg/kg of herring muscle tissue. KMD

2976 FALANDYSZ (J). Organochlorine pesticides and polychlorinated biphenyls in herring from the Southern Baltic, 1983. *Z. Lebensmittel-Unters. Forschung.* 182(2); 1986; 131-5

Pesticide residues in the muscle tissue of 187 herrings (*Clupea harengus*), netted in the Southern Baltic Sea in 1983, were found to be: HCB 14; α -BHC 18, β -BHC 23; γ -BHC 14; δ -BHC remained undetected; ϵ -BHC 56; p,p'-DDE 115; o,p;-DDD and o,p'-DDT remained undetected; p,p'-DDD 84; p,p'-DDI 51; DDT 250; and PCB 530 μ g/kg wet weight. The pesticide levels determined in the wet muscle, or extractable lipids, of herrings are nearly 2-3 times as high as those observed in the fish

that were caught 2 years earlier, while the PCB levels are comparable to those of the earlier years. The results have been compared with those of other authors. KMD

Krills

- 2977 SEHER (A) and LOSCHNER (D). Natural antioxidants. VI. Amino acid mixture as efficient synergists. *Fette Seifen Anstrichm.* 88(1); 1986; 1-6 (German)

Mixtures are produced from pure amino acids which correspond with regard to composition and synergetic effect to those which were formerly isolated from antarctic krill (*Euphausia superba* Dana). The importance of the different amino acids concerning the activity of the mixture is examined and an optimization of the mixture composition is derived from the obtained knowledge. Great changes in intensity of protection effect on lard occur by combination with different phenolic antioxidants. AA

Mackerel

- 2978 AMINULLAH BHUIYAN (AKM), RATNAYAKE (WMN) and ACKMAN (RG). Stability of lipids and polyunsaturated fatty acids during smoking of Atlantic mackerel (*Scomber scombrus* L.). *J. Am. Oil Chem. Soc.* 63(30); 1986; 324-8

Full Atlantic mackerel (*Scomber scombrus* L.), non-smoked and hot smoked according to the method of Torry (Aberdeen, Scotland) Advisory Note 82, in an AFOS-Torry Mini Kiln, were used to study changes in oxidative rancidity and composition of major lipid classes and fatty acids. After smoking there was an increase in thiobarbituric acid (TBAM) value and peroxide (PO) value, but the values were still indicative of acceptable quality. The percentages of triglycerides (TG) and phospholipid (PL) did not change significantly, and free fatty acids could barely be detected. The overall fatty acid composition remained virtually unchanged after the smoking process. This included the longer chain C_{20} and C_{22} n-3 fatty acids, now regarded as potentially essential fatty acids for humans. AA

Rainbow Trout

- 2979 DAWOOD (AA), ROY (RN) and WILLIAMS (CS). Quality of rainbow trout chilled-stored after post-catch holding. *J. Sci. Food Agric.* 37(4); 1986; 421-7

Rainbow trout (*Salmo gairdneri*) was held at (i) 10 C for 6 hours and iced, (ii) held at 20 C for 6 hours and iced and (iii) held at 30 C for 6 hours and iced. Results indicated that deterioration in quality was most pronounced when the fish was held at 30 C. Hypoxanthine values increased linearly over the period of storage and this could be used as chemical indicators of quality of fresh water trout. KAR

Sprats

- 2980 FALANDYSZ (J). Trace metals in sprats from the Southern Baltic, 1983. *Z. Lebensmittel-Unters Forschung.* 182(1); 1986; 40-43

Heavy metal contamination in the muscle tissue of 208 sprats (*Sprattus sprattus*), caught in different parts of the Southern Baltic Sea in 1983, was found to be as follows: Cd 0.31, Pb 0.10, Cu 0.59, Zn 14, Fe 12, Mn 0.26; and Ni 0.23 mg/kg of wet muscle. The mean levels of Cd and Pb are below the recommended tolerance levels. These results have been compared with earlier reports. KMD

Prawns

- 2981 ANGEL (S), JUVEN (DJ), WEINBERG (ZO), LINDNER (P) and EISENBERG (E). Effects of radurization and refrigerated storage on quality and shelf-life of freshwater prawns, *Macrobrachium rosenbergii*. J. Food Prot. 49(2); 1986; 142-5, 153

The effects of radurization on bacteriological, chemical, physical and sensory changes were studied in iced-stored fresh-water prawns of the species *Macrobrachium rosenbergii*. At both 145 and 230 krad, counts of potential spoilage bacteria were reduced. Irradiation at 230 krad resulted in increased TVBN values. No significant differences in texture (mushiness) were observed between irradiated and nonirradiated samples throughout the storage period. Atypical streptobacteria (D=59 krad) were the predominant organisms isolated from irradiated prawns after 4 weeks of refrigerated storage. No connection was found between development of mushiness and total or proteolytic bacterial counts. AA

Shrimps

- 2982 HO (M-L), CHENG (H-H) and JIANG (S-T). Effect of modified ice storage on the shelf-life of shrimp. Bull. Jpn. Soc. Sci. Fish. 52(3); 1986; 479-88

Use of crushed ice containing 3 and 7% NaCl extended the shelf life of shrimp by 8 and 7 days, longer than that in the case of crushed ice alone. When 0.1% K sorbate, or 0.1% K-sorbate, 0.05% Na-polyphosphate and 0.05% Na-pyrophosphate were added to crushed ice, the microbial growth and autolysis of shrimp meat retarded significantly. Crushed ice mixed with combination of 3% NaCl and 0.1% K-sorbate, or 3% NaCl, 0.1% K-sorbate, 0.05% Na-polyphosphate and 0.05% Na-pyrophosphate, showed better effects extending shelf life of fish to 17 days. KAR

- 2983 BHOBE (AM) and PAI (JS). Study of the properties of frozen shrimps. J. Food Sci. Technol. (India) 23(3); 1986; 143-7

Shrimps were stored at 0 C (chill) and at -18 C (frozen) condition for 15 and 180 days respectively and the changes in pH, trimethylamine (TMA) content, extract release volume (ERV), swelling and microbial counts were examined. At 0 C storage, pH raised from 6.86 to 9.50, TMA-N, 0.10 to 2.90 mg/100 g, % swelling from 50 to 480 and total plate count (TPC) from 26 to 10³ and ERV lowered from 48 to 5 within 15 days, whereas in -18 C the raise in pH was from 6.84 to 7.40, TMA-N from 0.100 to 0.256, mg/100g, and ERV, % swelling and TPC/g lowered from 48-38, 80-61, and 26³ 20 respectively within 180 days. Spoilage was evident in chilled samples in 12 days, whereas frozen samples did not spoil up to 6 months. Soluble proteins and masked - SH groups showed excellent correlation with texture of shrimps. Sensory evaluation done with the -118 C stored shrimps showed that appearance and odour were satisfactory although the shrimp was tough, chewy and rubbery after 6 months storage. KAR

- 2984 KRISHNAMURTHY (BV) and KARUNASAGAR (I). Microbiology of shrimps handled and stored in chilled sea water and in ice. J. Food Sci. Technol. (India) 23(3); 1986; 148-52

Shrimps (*Parapenaeopsis stylifera*, *Penaeus indicus* and *Metapenaeus dobsoni* of which the first one was dominating) soon after catch at sea were sorted on board and were kept in (i) insulated box containing chilled sea water (CSW) and in (ii) ice. After 28 hours, the shrimps were processed in 'peeled and undeveined' style, washed with chilled water, wrapped 250 g in polythene sheets in small waxed cartons and frozen at -28 C for 14 hours and stored at -18 C. Bacteriological analysis was done after storage for 28 hours but

before processing, after processing and after freezing. Gram positive flora predominated the fresh shrimps. Preservation in CSW for 28 hours encouraged the retention of most of the Gram positive flora present in fish sample, whereas in iced prawns all the Gram positive flora except *Micrococcus* were completely eliminated. Washing and processing of stored shrimps brought about drastic reduction in *Pseudomonas* and increase in *Aeromonas*. Freezing reduced the microflora except *Pseudomonas* group II, *Aeromonas*, *Bacillus* and *Micrococcus*. During processing *Staphylococcus*, *Arthrobacter*, *Bacillus*, *Corynebacterium* and yeasts were introduced into the iced shrimps, but freezing brought about 10-fold reduction in bacterial number. Frozen prawns from (i) organoleptically scored better than that from (ii). KAR

- 2985 CHARBONNEAU (R), DUBOIS (G), MICUSAN (V) and GAGNON (M). Effects of gamma rays on the conservation of northern shrimps and on their bacterial flora. *Sci. Aliment.* 6(2); 1986; 245-56 (French)

Pure cultures of certain bacterial strains isolated from shrimps were treated with γ -rays at doses ranging between 0 and 2.5 kGy. *Pseudomonas putrefaciens*, with D_{10} value (i.e. dose that brings about a 90% reduction in the number of micro-organisms) of 0.028 kGy was the least resistant organism, while a *Staphylococcus* strain was the most resistant (D_{10} -value 1.121 Gy). Frozen shrimps placed in a styrofoam box were also irradiated at 1.2 and 4 kGy. At 4 kGy, a 2 log decrease in the number of colony forming units was observed, and the storage life of the shrimps was extended. The 4 kGy dose also prolonged the storage life of pink shrimps kept at 10 C for 3-4 days to 8-9 days. KMD

PROTEINS FOODS

- 2986 GARTRELL (MJ), CRAUN (JC), PODREBARAC (DS) and GUNDERSON (EL). Pesticides, selected elements, and other chemicals in infant and toddler total diet samples, October 1980-March 1982. *J. Assoc. Off. Anal. Chem.* 69(1); 1986; 123-45

- 2987 HUTCHINSON (DJ), DISINSKI (FJ) and NARDELLI (CA). Determination of copper in infant formula by graphite furnace atomic absorption spectroscopy with a L'vov platform. *J. Assoc. Off. Anal. Chem.* 69(1); 1986; 60-64

A rapid method for the determination of sub-part-per-million levels of copper in infant formula, which does not require decomposition of the sample matrix before analysis, has been developed. The method uses L'vov platform graphite furnace atomic absorption spectroscopy (GFAAS), a technique that greatly reduces matrix interferences limiting the applicability of normal GFAAS. The sample preparation consists of dilution of a weighed sample of infant formula to a known volume with a 0.5% solution of Triton X-100 in deionized water. The accuracy of the method, as assessed from the results of overspike recovery studies (96.5-101.3% recovery) for different matrix type and comparison to results generated with alternative methodologies, can be considered excellent. The overall precision of the method ranges from 2.5 to 4.3% RSD for different matrix types. AA

- 2988 AYI (BK), YUHAS (DA) and DEANGELIS (NJ). Simultaneous determination of vitamins B2 (riboflavin) and B2 (pyridoxine) in infant formula products by reverse phase liquid chromatography. *J. Assoc. Off. Anal. Chem.* 69(1); 1986; 56-9

An ion pair liquid chromatographic (LC) method is described for the simultaneous determination of vitamins B2 and B6 in infant formula products. The method eliminates many of the UV absorbing ingredients

present in the infant formulations. The method involves extraction of the vitamins with distilled water followed by a filtration steps and the subsequent analysis of the filtrate by LC. Vitamins B2 and B6 and their vitamers are separated from each other as well as from ingredients in the sample matrix on a 5 μ m Spherisorb ODS column. The mobile phase consists of 85% 0.04M triethylammonium phosphate (pH 3.0), 10% methanol, 5% acetonitrile, and the counter ion, octane sulphonic acid sodium salt. The method is reproducible for both vitamins with relative standard deviations (RSD) ranging from ± 0.3 to $\pm 2.6\%$ depending on the infant formula product. The recoveries of the vitamins from various infant formula products are greater than 97%. The analysis for vitamins B2 and B6 in various lots of infant formula compared well with the official AOAC methods. AA

- 2989 LEE (TW). Quantitative determination of medium chain triglycerides in infant formula by reverse phase HPLC. *J. Am. Oil Chem. Soc.* 63(3); 1986; 317-20

Two methods were developed for the separation of medium chain triglycerides (MCT) using reverse phase HPLC. Both methods employed a C18 microbond HPLC column as the stationary phase and an isocratic solvent system. The first method consists of acetonitrile/acetone as the mobile phase with a differential refractometer as the detector. In the second method, acetonitrile/water was used as the mobile phase and a UV detector at 210 nm. Trinonanoïn was used as the internal standard for quantitative determination. This method is suitable for milk-, whey- and soy protein-based matrices. With minor modification, it is applicable to MCT levels ranging from 10 to 50% of total fat. AA

FRUIT JUICES AND BEVERAGES

Grape juices

- 2990 SABLAYROLLES (JM) and BARRE (P). Evolution of oxygen solubility during alcoholic fermentation of a grape must. Study with synthetical media. *Sci. Aliment.* 6(2); 1986; 177-84 (French)
- 2991 BEZANGER (MC), NAVARRO (JM), SABLAYROLLES (JM) and BARRE (P). Early forecasting of the time course of grape juice fermentation: Effects of initial nitrogen concentration and temperature. *Sci. Aliment.* 6(2); 1986; 185-200 (French)

Orange juices

- 2992 ABD EL-SALAM (MH), EL-SHIDINY (S), MAHFOUZ (MB) and EL-ETRIBY (H). The use of skim milk permeate in the preparation of spray dried beverages. Part I. Orange beverage. *Food Chem.* 20(2); 1986; 107-15
- Permeate was obtained by ultrafiltration of reconstituted skim milk (10% TS) and then concentrated by reverse osmosis and evaporation under vacuum to 27% TS. Orange juice was concentrated by vacuum evaporation to 18% TS and mixed with concentrated permeate at the rate of 1:3. Artificial colour was added and the mixture was spray dried at 160 C and 92 C inlet and outlet temperatures, respectively. Sugar was added to the resultant powder (1:1) by dry mixing; the powder was packed in polyethylene bags in airtight containers and stored at room temperature for 6 months. Changes in the chemical composition and physical properties of the powdered beverage were then followed. Also, organoleptic properties of the powder were evaluated by a taste panel with the reconstituted beverage (15% TS). Changes in the physical properties of the powder during storage were a decrease in occluded air and powder density and an increase in interstitial air, hygroscopic

picity and moisture content. The wettability of the powder slightly improved during storage. The composition of the beverage was almost unchanged during storage except in its vitamin contents where variable losses were detected. AA

Cocoa beans

- 2993 PETTIPHER (GL). An improved method for the extraction and quantitation of anthocyanins in cocoa beans and its use as an index of the degree of fermentation. *J. Sci. Food Agric.* 37(3); 1986; 289-96

A method for the extraction and quantitation of anthocyanins in cocoa beans is described. The principles of the method involve extraction in dilute acid, concentration and purification by means of a disposable reverse phase column and quantitation spectrophotometrically. The method recovers >95% of anthocyanins in the acid extract and has an average coefficient of variation of 12%. Results are presented for the effects of time of fermentation and the time of fermentation plus drying on the anthocyanin content of cocoa beans. Out test results and anthocyanin assay results are presented for commercial samples of different origins. AA

- 2994 PETTIPHER (GL). Analysis of cocoa pulp and the formulation of a standardised artificial cocoa pulp medium. *J. Sci. Food Agric.* 37(3); 1986; 297-309

Cocoa pulp was analysed for pH, viscosity a_w and concentration of soluble sugars, vitamins and anions. The composition of a defined cocoa pulp medium which has the same overall composition, pH, a_w and viscosity as cocoa pulp is described. The defined cocoa pulp medium supported the growth of yeasts, lactic acid bacteria and acetic acid bacteria. KAR

Coffee

- 2995 SCHUNEMANN (W) and MAIER (HG). On the specificity of photometrical chlorogenic acid determinations in coffee. *Dtsch. Lebensmittel-Rundschau.* 82(3); 1986; 73-6 (German)

The sum of chlorogenic acids according to the photometric DIN method and according to the HPLC has been determined in 2 green coffees and several roast coffees. With green coffees the values of the DIN method agreed, but with roast coffees the values of the DIN method were up to 250% higher than the HPLC values, dependent on the degree of roast. The cause are high molecular compounds with o-diphenol structures, eventually caffeic acid or chlorogenic acid residues. The reagents of some other photometric determinations also react with these groups and simulate in this way higher contents of chlorogenic acids. AA

- 2996 HAYASHI (T), REECE (CA) and SHIBAMOTO (T). Gas chromatographic determination of formaldehyde in coffee via thiazolidine derivative. *J. Assoc. Off. Anal. Chem.* 69(1); 1986; 101-5

Thiazolidine formed from trace quantities of formaldehyde in an aqueous solution containing cysteamine at pH 8 was extracted with chloroform and subsequently analyzed by a gas chromatograph equipped with a fused silica capillary column and a thermionic nitrogen-phosphorus specific detector. Recoveries of formaldehyde from the aqueous solutions at levels lower than 1 ppm were slightly over 100%. Quantitative analysis of formaldehyde in commercial brewed and instant coffees showed 3.4-4.5 ppm in the brewed and 10-16.3 ppm in the instant coffee. AA

- 2997 LEHMANN (G), GANZ (J) and SCHMIDT (F). Determination of trigonelline in coffee. *Dtsch. Lebensmittel-Rundschau.* 32(2); 1986; 43-6 (German)

Trigonelline is a main ingredient substance in coffee. During roasting, trigonelline is to a considerable degree decomposed into nicotinic acid, among others, so that one cup of coffee can cover 1/10 of the vitamin PP required per day. A procedure is described here that makes it possible to determine trigonelline in a simple and speedy way. The principle of the analysis is that, by means of magnesium oxide, coffee ingredients interfering with the determination are eliminated from the solution and that lipophilic substances are adsorbed when the solution is passed through an octadecyl-micro-column (Baker). In the filtrate the trigonelline can be determined through spectrophotometry. A total of 48 coffee samples of different roasting times has been examined. AA

Tea

- 2998 HARA (T). Research on gas substitution package of Japanese tea. Packag. Jpn. 7(31); 1986; 73-6

Discusses: Deterioration of tea during preservation; change in chlorophyll, automatic oxidation of catechin; oxidation of fatty substance and carotenoids; oxidation of ascorbic acid; gas substitution package of tea; and effects of gas substitution package. BSN

- 2999 SMITH (RF). New aspects on the chemistry of tea and coffee. III. Z. Lebensmittel-Unters. Forschung. 182(1); 1986; 1-7

The previous review for 1983/1984 is now continued with references to recent publications (1984/1985) and as before covers the chemistry and technology of tea (leaf, green and black) and coffee (raw, roasted and instant soluble), with particular reference to composition and changes during manufacture, extraction and storage. The effects of composition on the quality of the beverage, with mention of particular physiological properties, are included. AA

Brandy

- 3000 POSTEL (W) and ADAM (L). Analytical characterization of Spanish brandies. II. Products of the Spanish market. Dtsch. Lebensmittel-Rundschau. 82(2); 1986; 47-50 (German)

In 10 Spanish brandies from the Spanish market, 61 volatile components (17 alcohols, 4 terpenes, 9 carbonyl compounds, 31 esters), the contents of extract, glycerol and volatile acids, the pH value and the mineral compounds potassium, sodium, iron, and copper were determined. In general, Spanish brandies contain higher amounts of methanol and acetaldehyde and considerable smaller amounts of higher alcohols and esters than German and French brandies. Some products contain abnormally high amounts of 2-propanol (3.1-5.8 mg/100 ml A). All products do not comply with the legal provisions of Germany for brandy. The alcohol contents of the Spanish brandies investigated range from 36.0 to 39.9% volume, the extract contents from 6.8 to 17.8 g/l, the contents of volatile acids from 0.10 to 0.29 g/l, the pH-values from 3.2 to 4.7, potassium from 13 to 127 mg/l, sodium from 12 to 270 mg/l, iron from 0.1 to 1.1 mg/l, and copper from 1.2 to 7.0 mg/l; glycerol was not detectable, this in contrast to Spanish brandies available in Germany. AA

Wines

- 3001 GUERAIN (J), COGAT (P), DUMOULIN (E), AZAIS (B), DUARTE (A), ISAMBERT (A) and GHASSEMLOU (B). Study of captors, with a view to process automation - Application to a distillery. Ind. Aliment. Agric. 103(1-2); 1986; 5-12 (French)

Process control in a distillery requires automatic measurement of (1) dry matter content, (2) sugar content, and (3) ethanol content

in wines and wine-wash. Instant measurements of dry matter contents can be made by physical methods, such as vibration densimetry, refractive index, and infra-red absorption. The sugars-saccharose, glucose, fructose-present in the liquid products of a distillery can be measured by HPLC, after suitable preparation of the samples. Ethanol can be measured by enzymatic estimation, or by gas phase chromatography, or by near-infrared absorption. The ethanol content of superfine liquor can also be obtained by vibration densimetry, with a precision of 0.02% (by volume). Captors that capture various chemical components, can give us the information that is needed for the control of the whole process. KMD

- 3002 ESTRELLA (MI), HERNANDEZ (MT) and OLANO (A). Changes in polyalcohol and phenol compound contents in the ageing of sherry wines. *Food Chem.* 20(2); 1986; 137-52

Polyalcohols did not follow any regular pattern of variation during the ageing process in the wines studied. In most of the systems, the aldehydes and total phenolic acids underwent a steady increase during ageing. KAR

- 3003 SIMPSON (RF), AMON (JM) and DAW (AJ). Off-flavour in wine caused by guaiacol. *Food Technol. Aust.* 38(1); 1986; 31-3

Corks contaminated with guaiacol, probably during shipping or storage before reaching the winery, were shown to be responsible for a taint in bottled wine. Guaiacol concentration in wine was determined by distillation, methylene chloride extraction, extract concentration and analysis by gas chromatography-mass spectrometry with selected ion monitoring. The guaiacol concentration of the corks was similarly determined. Tainted wine and the associated cork contained 0.07-2.63 mg/L and 0.13-2.07 mg of guaiacol, respectively; sound wine from the same bottling and the associated cork contained 0.003-0.006 mg/L and 0.001-0.007 mg of guaiacol, respectively. AA

- 3004 BARILLERE (JM), BENARD (P), VANNOBEL (C) and CHABAS (J). Statistical study of analytical parameters of red wines obtained by different vinification methods after thermovinification. *Sci. Aliment.* 6(2); 1986; 201-11 (French)

- 3005 GUNTERT (M), RAPP (A), TAKEOKA (GR) and JENNINGS (W). HRGC and HRGC-MS applied to wine constituents of lower volatility. *Z. Lebensmittel Unters. Forschung.* 182(3); 1986; 200-204

The constituents of a White Riesling wine (vintage 1984) were isolated by continuous liquid-liquid extraction with trichlorofluoromethane/dichloromethane (9+1, v/v). The extracts were analysed by capillary gas chromatography and capillary gas chromatography-mass spectrometry (EI) on a polar stationary phases to investigate compounds of lower volatility. The identified constituents included 12 phenols, 3 indoles, 2 lactones and 5 miscellaneous wine compounds. Of the 22 substances identified, 7 are reported for the first time in white wine (5 of these in wine). AA

- 3006 KUHLMANN (F). A speedy method to determine diethylene glycol in wine. *Dtsch. Lebensmittel-Rundschau.* 82(3); 1986; 84-5 (German)

A method is described to determine, in series, diethylene glycol (DEG) in wine; it is speedy, specific and sensitive. After an extraction with chloroform, DEG is determined directly through capillary GC/FID or capillary GC-MS. Detection limits are 2 mg/l (GC) and 0.2 mg/l (MS). AA

- 3007 SANTA-MARIA (G), GARRIDO (JL) and DIEZ (C). The use of phenol compounds as parameters for distinguishing red and rose wines from pale wines in multivariate analysis. *Z. Lebensmittel Unters. Forschung.*

182(2); 1986; 112-4

The concentration of different types of phenol compounds and the ratio of such compounds to total phenols was established for red, rose, and pale ("claret") wines. Linear discriminant analysis was applied to these parameters to differentiate the red and rose wines from the pale wines. Two discriminant functions correctly classified 100% of the red and rose wines and 93.3% of the pale wines, with classification errors of 0.87% for the red wine-pale wine function and 1.7×10^{-4} for the rose wine-pale wine function. AA'

OILS AND FATS

Oils

- 3008 SYVAOJA (E-L), PIIRONEN (V), VARO (P), KOIVISTOINEN (P) and SALMINEN (K). Tocopherols and tocotrienols in Finnish foods: Oils and fats. *J. Am. Oil Chem. Soc.* 63(3); 1986; 328-9
- The tocopherols and tocotrienols of vegetable oils, cod liver oil, margarines, butter and Voimariini dairy spread were analyzed by HPLC. The total tocopherol content varied from 4 (coconut oil) to 242 mg/100 g (wheat germ oil). α -tocopherol equivalents varied from 2 (coconut oil) to 225 mg/100 g (wheat germ oil). Semisoft and soft margarines had an average total tocopherol of 53 and 61 mg, and an average α -tocopherol equivalent of 17 and 27 mg/100 g, respectively. Hard margarines averaged 29 mg total tocopherol and 9 mg α -tocopherol equivalent/100 g. The average tocopherol content of butter and Voimariini was 2 and 15 mg/100 g, respectively, and the average α -tocopherol equivalent 2 and 6 mg/100 g. AA
- 3009 DAVIES (AMC) and BROCKLEHURST (TF). Near infrared reflectance analysis of oil concentration in an emulsion: A study of oil and water migrations in a mayonnaise-based salad. *J. Sci. Food Agric.* 37(3); 1986; 310-16
- Equations were derived for estimating the oil concentration in mayonnaise containing 11-75% (w/w) oil in mayonnaise-based salads by measurements of absorption using a near infrared scanning spectrometer (Neotec 6350 Research Composition Analyzer). The precision of the predictions averaged from two or three equations was better than $\pm 1.0\%$ at an oil concentration of 40% (w/w). The use of the method is demonstrated by its application to a study of the migration of oil and water in coleslaw during the first 6 hours after production. AA
- 3010 RANDRIAMIHARISOA (R), GAYDOU (EM), BIANCHINI (J-P), RAVELOJAONA (G) and VERNIN (G). Study of the variation in the chemical composition and classification of basil essential oils from Madagascar. *Sci. Aliment.* 6(2); 1986; 221-31 (French)
- 3011 KERSHAW (SJ). Comparison of two standard methods for determination of free fatty acids content in oils extracted from oilseeds and vegetable oils. *J. Sci. Food Agric.* 37(2); 1986; 267-72
- Two standard titrimetric procedures involving dissolution of the fat in an organic solvent and titration with standard alkali solution using phenolphthalein as indicator have been tried. Results obtained using each of the two methods agree closely in most cases and certainly for commercial contractual purposes the two methods are interchangeable. KAR
- 3012 LUDWICKI (J), TAYEB (IB) and DILLON (J-C). Losses of alpha-tocopherol and alpha- and beta-carotenes at various steps of the refining process of a mixed vegetable oil. *Sci. Aliment.* 6(2); 1986; 287-99

- 3013 WHITNEY (RW), ROTH (LO) and UNDERWOOD (TL). Flow of vegetable oil-pesticide blank-formulation mixtures through agricultural spray nozzles. *J. Am. Oil Chem. Soc.* 63(3); 1986; 340-45
- 3014 BITNER (ED), FRIEDRICH (JP) and MOUNTS (TL). Laboratory continuous deodorizer for vegetable oils. *J. Am. Oil Chem. Soc.* 63(3); 1986; 338-40

A laboratory-scale continuous deodorizer, based on a modified Snyder distillation column, was constructed and tested for the deodorization of alkali-refined and bleached vegetable oils. Soybean oil extracted with supercritical carbon dioxide and without further processing also was deodorized to a finished edible oil. Results of taste panel evaluations of the finished oils show that the quality of oils deodorized over a temperature range of 194-260 C is equivalent to commercial salad oils. Oil flow rates are 1 to 2 ml/minutes and contact time is about 5 minutes; a vacuum of 0.5 to 1.0 mm Hg is maintained with countercurrent steamflow of 1 to 5% of the oil weight. Small samples of oil (250-1000 ml) are readily accommodated in this equipment, and the deodorization conditions more nearly simulate commercial practice than do traditional small-scale batch deodorizers. AA

Avocado oil

- 3015 WERMAN (MJ) and NEEMAN (I). Oxidative stability of avocado oil. *J. Am. Oil Chem. Soc.* 63(2); 1986; 355-60
- 3016 WERMAN (MJ) and NEEMAN (I). Effectiveness of antioxidants in refined, bleached avocado oil. *J. Am. Oil Chem. Soc.* 63(3); 1986; 352-5

Maize oil

- 3017 AGUILERA (JM) and LUSAS (EW). Laboratory and pilot solvent extraction of extruded high-oil corn. *J. Am. Oil Chem. Soc.* 63(2); 1986; 239-43

Oil extraction of flakes and extrudates of high-oil (HO) corn was studied, using hexane as solvent. HO corn contained 19.5% oil, 70% of which was located in the germ. Microstructures of starchy endosperm and germ were analyzed by scanning electron and light microscopy. Conventionally extruded samples extracted faster and to a lower residual oil content than flakes and steam-injected extrudates. Ultrastructural disruption and cooking of conventionally extruded material was adequate to free the oil from the spherosomes and produce a porous pellet with a high proportion of "surface oil". Encapsulation of the oil within a gelatinized starch matrix made it partly unavailable in steam-injected extrudate samples. Data presented for laboratory and pilot plant runs demonstrate that conventional extrusion is a promising pretreatment for solvent extraction of high-oil, starchy materials. AA

Olive oils

- 3018 BOSKOU (D) and CHRYSFAFIDIS (D). Distribution of isomeric octadecenoic fatty acids in commercially hydrogenated olive oil. *Fette Seifen Anstrichm.* 88(1); 1986; 13-5

Palm oil

- 3019 GOH (SH) and GEE (PT). Noncarotenoid hydrocarbons in palm oil and palm fatty acid distillate. *J. Am. Oil Chem. Soc.* 63(2); 1986; 226-30

Column chromatographic and gas chromatographic-mass spectrometric (GCMS) analyses for minor and trace non carotenoid hydrocarbons of crude palm oil and palm fatty acid distillate revealed the presence of a wide range of n-alkanes ($C_{12}H_{26}$ to $C_{36}H_{74}$) and n-alkenes in addition

to the major component, squalene. Hydrocarbon components concentrated in palm fatty acid distillate where squalene was dominant, but degradation products such as alkenes (from fatty acids or glycerides), aromatic hydrocarbons (from carotenes) and diterpene hydrocarbons (from tocotrienols) were detected in significant quantities, superseding the naturally occurring n-alkanes. Mechanisms proposed suggest that degradation of the valuable vitamin E or tocotrienols needs to be minimized in physical refining. AA

- 3020 GAPOR (A), KATO (A) and ONG (ASH). α -tocopherol content in oil palm leaflet. J. Am. Oil Chem. Soc. 63(3); 1986; 330-31

Mature oil palm leaflets are readily available as byproducts from oil palm plantations. α -Tocopherol and chlorophyll contents of palm leaflets obtained from oil palm trees of different ages and varieties were determined. α -Tocopherol and chlorophyll contents were in the range of 0.14-0.28% and 0.23-0.31%, respectively, in palm leaflets on wet bases. The molar ratios of α -tocopherol to chlorophyll were 0.78-2.37. AA

Soybean oils

- 3021 NASH (AM) and FRANKEL (EN). Limited extraction of soybeans with hexane. J. Am. Oil Chem. Soc. 63(2); 1986; 244-6

Soybean flakes were extracted with lower than optimal quantities of hexane in the laboratories and comparisons were made of oil yield, phospholipids yield and phospholipids composition as a function of the volume of hexane. Although the oil yield and the total amount of phosphorus were significantly decreased with limited volumes of hexane, the distribution of phospholipid components remained essentially the same. Because the oil obtained by this limited solvent extraction contained less phosphatides, it is expected to be more easily processed by conventional techniques. AA

- 3022 MARTIN (BA), WILSON (RF) and RINNE (RW). Temperature effects upon the expression of a high oleic acid trait in soybean. J. Am. Oil Chem. Soc. 63(3); 1986; 346-52

Soybeans (Glycine max L. Merr. cvs. N78-2245 and Dare) were grown to maturity under controlled environments to investigate temperature effects upon the fatty acid composition of developing seed. These genotypes exhibited genetic differences in oleic acid (18:1) content. Mature seed from N78-2245 germplasm normally contained ca. 43 mol% 18:1, and Dare seed contained ca. 18 mol% 18:1. When grown at 30/26 C or 22/18 C, the overall response of these genotypes to temperature resulted in lower 18:1 and higher linoleic (18:2) and linolenic (18:3) acid concentrations in mature seed. However, the genotypic response was much more pronounced in N78-2245 seed than in Dare seed. The basis for these genotypic differences appeared to be related to temperature effects upon the differentiation of the 18:1 synthetic and 18:1-desaturation mechanisms during seed development. Although the high-18:1 trait was expressed during N78-2245 seed development at both temperatures, high 18:1 glycerolipids accumulated during a shorter developmental period at 22/18 C than at 30/26 C. At 30/26 C, glycerolipids containing greater than 50% 18:1 were deposited between 20 and 45 days after flowering (DAF) and accounted for 84% (w/w) of the oil in mature seed. At 22/18 C, glycerolipids with similar fatty acid composition were formed between 30 and 45 DAF and accounted for only 40% (w/w) of the oil. Temperature effects upon 18:1-desaturation also appeared to mediate the overall differences in unsaturated fatty acid composition in these genotypes. The 18:1 desaturation mechanism in N78-2245 seed was more sensitive to temperature than that in Dare seed. These genotype-treatment combinations were ranked by degree of 18:1-desaturation in the order: Dare (22/18 C) = Dare (30/26

C) > N78-2245 (22/18 C) > N78-2245 (30/26 C). It was proposed that the ranking of these genotype-treatment combinations may be attributed, in part, to the tissue levels of the 18:1-desaturase enzymes in soybean seed grown at different temperatures. AA

- 3023 PATIL (KB), SHIVAMURTHY (SC) and BADAMI (RC). Effect of fungi on the lipid composition of soybean during storage at different levels of humidity. *Fette Seifen Anstrichm.* 88(1); 1986; 18-9

Soybean seeds inoculated with different fungi such as *Aspergillus niger*, *Aspergillus flavus*, *Fusarium solani*, *Cladosporium herbaceum* and *Rhizopus stolonifera*, were stored for three months at 60, 70, 80, 90 and 100% humidity levels. There was no perceptible change in oil, protein, sugar and fatty acid composition at 60% humidity. However, as the humidity increased, the oil and total sugar content of the seeds decreased gradually, but proportional increase of protein content was noted and this may be due to the biological utilisation of fat and carbohydrates by the fungi for conversion into protein. The principal change in the fatty acid composition was that of increase in oleic acid and proportional decrease of linoleic and linolenic acids, the corresponding rate of increase and decrease of the above said fatty acid composition was equal. AA

- 3024 SOTIRHOS (N), HO (C-T) and CHANG (SS). High performance liquid chromatographic analysis of soybean phospholipids. *Fette Seifen Anstrichm.* 88(1); 1986; 6-8

Terminalia bellirica oil

- 3025 RUKMINI (C) and UDAYASEKHARA RAO (P). Chemical and nutritional studies on *Terminalia bellirica* Roxb. kernel and its oil. *J. Am. Oil Chem. Soc.* 63(3); 1986; 360-63

Fats

- 3026 ARENS (M), KRUSCHE (G) and SCHNEEWEIS (G). Survey by a working party of the DGF, 93th report: German standard methods for investigation of fats, fatty products and related materials, 70th report: Analysis of organic surface active compounds XII. *Fette Seifen Anstrichm.* 88(1); 1986; 9-13 (German)

- 3027 ATHNASIOS (AK), HEALY (EJ), GROSS (AF) and TEMPLEMAN (GJ). Determination of *cis*-*cis*-methylene interrupted polyunsaturated fatty acids in fats and oils by capillary gas chromatography. *J. Assoc. Off. Anal. Chem.* 69(1); 1986; 65-7

A capillary gas chromatographic (CGC) method is described for the determination of *cis*, *cis*-methylene interrupted polyunsaturated fatty acids (*cis*-PUFA) in fats and oils. The sample is saponified and the liberated fatty acids are esterified to the corresponding methyl esters. The latter are analyzed by CGC using a 60M SP2340 capillary column. Area percent values for 9,12-*cis*, *cis*-¹⁸:2 and 9,12,15-*cis*, *cis*-¹⁹:2 fatty acid methyl esters are summed to give the total *cis*-PUFA content. Gas chromatographic results agreed well with those obtained by an enzymatic lipooxygenase method at the 31-48% *cis*-PUFA levels with a correlation coefficient of 0.98. The method has a precision (relative standard deviation) of 0.33% at a 44.4% *cis*-PUFA level in margarine oil. AA

- 3028 ABDEL-MOETY (EM), AHMAD (A-KS) and EL-DIN (MS). Determination of iodine values of lipids by bromide ion selective electrode. *J. Assoc. Off. Anal. Chem.* 69(1); 1986; 67-9

- 3029 HASSANIEN (FR), RAGAB (M) and EL-MAKHZANGY (A). Studies on the possibility of producing fats from food wastes by using microorganisms I: Factors affecting fat production from different fungi. *Fette Seifen Anstrichm.* 88(1); 1986; 33-8

Factors affecting fat production from different fungi including incubation temperature, incubation period, pH-value, sugar concentration, spore count and carbon:nitrogen (C/N) ratio were studied. The optimum conditions enhancing the production of lipids from molasses media as food wastes by using *Aspergillus niger*, *Aspergillus oryzae*, *Penicillium roqueforti* and *Rhizopus arrhizus* were: 30, 25, 30 and 30 °C for incubation temperature; 3, 7, 7, and 7 days for incubation period; 5, 50:1; 7, 70:1; 5, 50:1 and 5, 50:1 for glucose percent and C/N ratio; 5, 6, 6 and 7 for pH-values and 2×10^4 , 1.5×10^4 , 2×10^4 and 1.3×10^5 for spore concentrations respectively. The oil contents of mycelium and fat coefficient obtained from the studied fungi grown in carrot wastes media were less than that resulted in molasses media. AA

Butter

- 3030 KUPRANYCZ (DB), AMER (MA) and BAKER (BE). Effects of thermal oxidation on the constitution of butterfat, butterfat fractions and certain vegetable oils. *J. Am. Oil Chem. Soc.* 63(2); 1986; 332-7

To evaluate the thermal oxidative behaviour of butterfat in comparison to selected vegetable oils, samples of winter and summer butterfat liquid and solid butterfat fractions, and selected vegetable oils were heated at 185 °C in the presence of air (30 ml/minutes) for 8 and 16 hours. The resultant heated fats and oils, as well as the methyl esters of their fatty acids, were examined by gel permeation chromatography. The results indicated that butterfat is much more stable to thermal oxidation than canola, sunflower and soybean oils. This was evidenced by a substantially higher content of both dimeric and higher oligomeric triglycerides in the vegetable oils than in any of the butterfat samples after both 8 and 16 hours of heating. The corn oil also exhibited a high degree of stability to thermal oxidation after 8 hour of heating. The 16 hour corn oil data, however, was less certain due to the presence of a very viscous and dark coloured material which could not be removed from the oxidation flask; this was believed to contain highly polymerized oil and was not observed with any of the other samples. There were some differences in the intermolecular polymerization of the butterfat fractions compared with each other and with whole butterfat. With the winter butterfat samples, after 8 hour of thermal oxidation, both the solid and liquid butterfat fractions exhibited more stability toward intermolecular polymerization than did the whole butterfat. After 16 hour of heating the ratio of trimeric and higher oligomeric triglycerides to dimeric triglycerides increased with increasing degree of unsaturation of the butterfat and with increased time of heating. Similar trends were observed with regard to the degree of intramolecular polymerization. AA

- 3031 SOLIMAN (MA) and YOUNES (NA). Adulterated butterfat: Fatty acid composition of triglycerides and 2-monoglycerides. *J. Am. Oil Chem. Soc.* 63(2); 1986; 248-50

Beef tallow and cottonseed oil were mixed with a pure butterfat in the ratios of 2%, 4% and 6% to obtain admixtures of beef tallow with butterfat and cottonseed oil with butterfat. The hydrolysis of individual triglycerides was carried out using the lipase to obtain 2-monoglycerides. The results indicated that butterfat had a higher percentage of $C_{14:0}$ and $C_{16:0}$ acids than found in the triglycerides and 2-monoglycerides of beef tallow and cottonseed oil. Beef tallow contained a higher proportion of $C_{18:0}$ and $C_{18:1}$ acids than butter fat and cottonseed oil triglycerides or 2-monoglycerides. Cottonseed oil had a higher percentage of $C_{18:2}$ acid located in triglyceride or 2-

monoglyceride than found in butterfat or beef tallow triglycerides and 2-monoglycerides. The analysis of the samples of butterfat containing 2%, 4% and 6% beef tallow revealed that the addition of beef tallow to butterfat affected the fatty acid composition of butterfat triglycerides and 2-monoglycerides with C18:0 and C18:1 acids; the effect was increased with increasing percentages of beef tallow. The addition of cottonseed oil to butterfat in the ratios of 2%, 4% and 6% affected the fatty acid composition of butterfat triglycerides and 2-monoglycerides. It was found that both C18:1 and C18:2 increased as the added cottonseed oil percentages increased. AA

Cocoa butter

- 3032 GARTI (N), SCHLICHTER (J) and SARIG (S). Effect of food emulsifiers on polymorphic transitions of cocoa butter. *J. Am. Oil Chem. Soc.* 63(2); 1986; 230-36

The polymorphic behaviour of cocoa butter in the presence of several food emulsifiers serving as crystal structure modifiers was investigated. Emphasis was placed on transitions among the relatively stable forms IV, V and VI, which are significant for a confectionery industry. As known from industry work, within the series of sorbitan esters and ethoxylated sorbitan esters, the solid emulsifiers were the most efficient in retarding transition of V form into VI modification. Blends of sorbitan monostearate (Span 60), ethoxylated sorbitan monostearate (Tween 60) and Span 60-Tween 65 used in the present study were particularly effective. Surprisingly, it was found that some combinations of emulsifiers accelerate the transition of form IV into form V. Transition of form V into form VI occurs via the solid state, and other transitions are known to take place via the liquid phase. Emulsifier was found to increase liquid fraction of the fat prior to its transition. Mechanistic considerations concerning these transitions are suggested. AA

Jojoba wax

- 3033 KAMPF (A), GRINBERG (S) and GALUN (A). Oxidative stability of jojoba wax. *J. Am. Oil Chem. Soc.* 63(2); 1986; 246-8

SPICES AND CONDIMENTS

Chillies

- 3034 PARMINDER SINGH, SHARMA (PP) and ARYA (PS). Studies on the effect of nitrogen and potassium on growth, fruit yield and quality of chilli. *Indian Cocoa, Arecanut Spices J.* 9(3); 1980; 67-9

The increase in fruit number, fruit length, fruit diam., DM and vitamin C contents of chillies was observed with increase in N application (30, 60, 90 kg/ha) to plants and was linear upto 90 kg/ha. BSN

Paprika

- 3035 CARBONELL (JV), PINAGA (F), YUSA (V) and PENA (JL). The dehydration of paprika with ambient and heated air and the kinetics of colour degradation during storage. *J. Food Eng.* 5(3); 1986; 179-93

The hygroscopic behaviour of dried red pepper is characterized by means of water vapour adsorption isotherms at 5, 20 and 35 C; from the GAB equation, a monolayer water content of 0.0816 Kg \cdot H₂O per kg dry matter has been deduced. The effect of temperature on the drying rate of pepper is considered and yields were compared when the drying is carried out with ambient air and with different loading densities

(10-40 kg m⁻²). The kinetics of paprika colour degradation during storage at different temperatures and with a moisture content corresponding to the monolayer have been studied. A sharp change in the rate of colour loss is observed at 15 C; the value Q_{10} (C) changes from 1.62 to 2.82 when the temperature rises above 15 C. AA

SENSORY EVALUATION

- 3036 HEATH (H). Sensory perception. Molecular structure and sensory attributes: An overview. (Part I). Food Flavour. Ingrid. Process. Packag. 8(3); 1986; 40-41,43

Discusses briefly; sense of taste; sense of smell; and molecular structure and taste. BSN

- 3037 STANLEY (DW). Chemical and structural determinants of texture of fabricated foods. Food Technol. 40(3); 1986; 65-8, 76

FOOD STORAGE

- 3038 OFOLI (RY) and BURGESS (GJ). A thermodynamic approach to heat and mass transport in stored agricultural products. J. Food Eng. 5(3); 1986; 195-216

The fundamental laws of equilibrium thermodynamics and a mass transport equation based on non-equilibrium thermodynamics are used to analyze the temperature and moisture concentration fields in the porous medium of an agricultural storage bin. The non-linear differential equations are integrated numerically and the results are shown to compare favourably with experimental data obtained from the literature. AA

INFESTATION CONTROL AND PESTICIDES

- 3039 KLEIN (RM). Pictorial guide for rapid identification of common adult storage insects. J. Food Prot. 49(2); 1986; 154-60

To assist analysts with identification of the adult insects most commonly found in foods, detailed drawings of 21 such insects are provided. For each example, accompanying text summarizes the identifying characteristics and gives additional information about its name and habits. Larger scale drawings of adult antennae and mandibles are included with most examples. AA

- 3040 MCGUIRE (EJ), DiFONZO (CJ), MARTIN (RA) and IGLESIA (FA). Evaluation of chronic toxicity and carcinogenesis in rodents with the synthetic analgesic, tilidine fumarate. Toxicology. 39(2); 1986; 149-63

Data generated have shown that synthetic analgesic tilidine does not possess tumorigenic potential in rodents. BSN

- 3041 MKHIZE (JN). Dosage-mortality responses of the rice weevil, *Sitophilus oryzae* (L.), to an insect growth regulator, R-20458. Effects of R-20458 F₂ progeny production. Insect Sci. Applic. 7(1); 1986; 19-21

BIOCHEMISTRY AND NUTRITION

- 3042 BLENFORD (D). The rough with the smooth. Food Flavour. Ingrid. Proc-

ess. Packag. 8(3); 1986; 29,31

Discusses briefly the nature and importance of dietary fibres in human nutrition. BSN

- 3043 KILARA (A) and SHARKASI (TY). Effects of temperature on food proteins and its implications on functional properties. *CRC Crit. Rev. Food Sci. Nutr.* 23(4); 1986; 323-95

Discusses: Chemistry of native proteins; chemistry of protein denaturation; methods to assess denaturation; soy proteins; milk proteins; and egg proteins. BSN

- 3044 MUSCHIOLIK (G), ACKERMANN (K) and HAHNEMANN (H). Ascertainment of emulsifying functions for characterization of the emulsifying property of protein preparations. *Nahrung.* 30(1); 1986; 101-3 (German)

- 3045 POLYAKOV (VI), POPELLO (IA), GRINBERG (VYa) and TOLSTOGUZOV (VB). Thermodynamic compatibility of proteins in aqueous media. Part 3. Studies on the role of intermolecular interactions in the thermodynamics of compatibility of proteins according to the data of dilution enthalpies. *Nahrung.* 30(1); 1986; 81-8 (German)

- 3046 UHDE (W-J) and MACHOLZ (R). Mutagenic substances in amino acid and protein pyrolyzates as well as in heat-treated food. *Nahrung.* 30(1); 1986; 59-73 (German)

Information on the recent knowledge of occurrence and formation of heterocyclic substances as results of the pyrolysis of amino acids and protein as well as of heat-treatment of food is given. Positive results obtained by means of the Ames-test point to the possibility that the tested substances might also have mutagenic or carcinogenic effect on man. Up to now a corroboration of possible delayed lesions could not be definitely proved in animal experiments. It may be taken for granted that the preparation and especially the heat treatment of foods could induce the formation of products being injurious to health. Chemical substances being known in this respect are specified with reference to their occurrence. AA

- 3047 VINH (LT) and DWORSCHAK (E). Trypsin and chymotrypsin inhibitor activities in plant foods from Vietnam and Hungary. *Nahrung.* 30(1); 1986; 53-8

A method for the determination of chymotrypsin inhibitor activity and a screening test for evaluating higher activities of trypsin inhibitor were elaborated. The protease inhibitor activities of the most important plant foods from Vietnam and Hungary were determined. In cereals and legume seeds, the activity of chymotrypsin inhibitors is generally lower than that of the trypsin inhibitors. In various soy products (isolates, texturates), the extent of lowering of chymotrypsin inhibitor activity was less than that of trypsin inhibitor related to raw soybean. The cooking process according to the usual kitchen technique of Vietnam has more effect on the higher trypsin inhibitor level of soybean than on other legumes of average activity.. AA

- 3048 UMOH (IB), MADUAGWU (EN) and AMOLE (AA). Fate of ingested linamarin in malnourished rats. *Food Chem.* 20(1); 1986; 1-9

Pure linamarin, the principle cyanogenic compound in cassava, at a dose level of 30 g per 100 g body weight was administered in food to a rats maintained on vitamin B2 deficient, and Kwashiorkor rats. Faces collected after 24 to 72 hours showed no detectable cyanide or intact linamarin. The Kwashiorkor rats, excreted less thiocyanate than the controls. Dietary protein deficiency prolongs the time of metabolism and hence increases the toxicity of cyanogenic glycoside in the body. KAR

TISSUE CULTURE

- 049 RECH (EL) and PIRES (MJP). Tissue culture propagation of *Mentha* spp. by the use of axillary buds. *Plant Cell Rep.* 5(1); 1986; 17-8

A method is described for rapid multiplication from axillary buds of six *Mentha* species. Nodal segments from one-year old plants were grown on Murashige and Skoog medium (BMS), supplemented with BAP (1.0:2.0 mg/l) and KIN (1.0 mg/l) and kept at 28 ± 1 C under fluorescent light for 30 days. After this period, several shoots (15-20 shoots per explant) with roots were produced which were placed in soil for further growth. AA

TOXICOLOGY AND HYGIENE

- 3050 NHACHI (CFB). Evidence for the inductive effects of hexafluorobenzene on hepatic microsomal enzyme in the male rat. *Toxicology.* 39(3); 1986; 317-21

- 3051 ABOU-SETTA (MM), SORRELL (RW) and CHILDERS (CC). A computer program in basic for determining probit and log-probit or logit correlation for toxicology and biology. *Bull. Environ. Contam. Toxicol.* 36(2); 1986; 242-9

- 3052 ANSARI (GAS), JAMES (GP), HU (LA) and REYNOLDS (ES). Organochlorine residues in adipose tissue of residents of the Texas gulf coast. *Bull. Environ. Contam. Toxicol.* 36(2); 1986; 311-6

- 3053 GARMAN (RH), SNELLINGS (WM) and MARONPOT (RR). Frequency, size and location of brain tumours in F-344 rats chronically exposed to ethylene oxide. *Food Chem. Toxicol.* 24(2); 1986; 145-53

- 3054 ASUZU (IU) and UNDE (A). Some observations on the toxic effects of the seed extract of *Sphenostylis stenocarpa* (Hochst ex A. Rich) Harms. On intestinal muscle. *Qual. Plant. Plant Foods Hum. Nutr.* 36(1); 1986; 3-9

- 3055 SLANINA (P) and FAGERLUND (B). Veterinary drug residues in foods - health effects. *Varfoda.* 38(3-4); 1986; 224-38

- 3056 STAVNSBJERG (M), HJORTKJAER (RK), BILLE-HANSEN (V), JENSEN (BF), GREE-NOUGH (RJ), McCONVILLE (M), HOLSTROEM (M) and HAZELDEN (KP). Toxicological safety evaluation of a *Bacillus acidopullulyticus* pullulanase. *J. Food Prot.* 49(2); 1986; 146-53

- 3057 PALUMBO (SA). *Campylobacter jejuni* in foods: Its occurrence, isolation from foods, and injury. *J. Food Prot.* 49(2); 1986; 161-6
- The following aspects of *Campylobacter jejuni* has been reviewed: characteristics of *C. jejuni*, its occurrence in foods, methods to quantitatively recover the organism from food, and heat injury and freeze-thaw stress of *C. jejuni*. *C. jejuni* can be heat injured in 0.1 M potassium phosphate buffer at 46 C. Heat injury can be demonstrated as the differential count between brucella agar plus ferrous sulphate, sodium metabisulphite and sodium pyruvate (FBP) and brilliant green bile broth agar plus FBP. Heat-injured *C. jejuni* will grow on brucella agar containing either of the three antibiotic mixtures typically used to isolate *C. jejuni*. Heat-injured *C. jejuni* will repair (regain dye and bile tolerance) in brucella broth plus FBP. *C. jejuni* can be freeze-thaw stressed. This stress is demonstrated as a

sensitivity to the antibiotic polymyxin B or incubation of 42 C. Addition of succinate and cysteine increased recovery of freeze-thaw stressed *C. jejuni*. Although the presence of injured/stressed *C. jejuni* in foods has not yet been detected, methods are now available to begin this search. The injury/stress process may explain the often encountered difficulty in isolating *C. jejuni*, especially low numbers, from foods. AA

- 3058 IBRAHIM (GF), LYONS (MJ), WALKER (RA) and FLEET (GH). Rapid detection of salmonellae in foods using immunoassay systems. *J. Food Prot.* 49(2); 1986; 92-8

A standard cultural method, radioimmunometric (RIMA) and enzyme immunometric (EIMA) assays were compared for detection of salmonellae in 235 food samples. The immunoassays used titanous hydroxide as the solid-phase, commercial Spicer-Edwards salmonella polyvalent H antisera (SEA) or pooled antisera produced against 10 salmonella flagellins (PFA). Nineteen food samples were positive for *Salmonella* by the standard cultural method. These as well as one additional sample were also positive for *Salmonella* by RIMA and EIMA. No false-negative results were obtained from the immunoassays using PFA, whereas two false-negative results were obtained when SEA was used. The incidence of false-positive results when SEA and PFA were used were, respectively, 3.0 and 0.9% with RIMA and 2.6 and 0.9% with EIMA. The immunoassays were also able to detect 77 *Salmonella* serotypes when grown alone or in association with other species of *Enterobacteriaceae*, in mannitol selenite cystine broth. Both immunoassays performed reliably on enrichment cultures stored under refrigeration for up to 9 days. Also, of 6 non-motile salmonellae, 5 were detectable by the immunoassays. The immunoassays were simple, rapid and cost-efficient. AA

- 3059 ENGELHARDT (G), SCHUSTER (M), LEPSCHY (J) and WALLNOFER (PR). Production of mycotoxins by *Fusarium* species isolated in Germany. 1. Time course of deoxynivalenol, 3-acetyldeoxynivalenol, and zearalenone formation on solid substrates. 2. *Lebensmittel Unters. Forsch.* 182(2); 1986; 123-6

Cultures of *Fusarium tricinactum* 434 formed large amounts of the trichothecene mycotoxins deoxynivalenol (DON) and 3-acetyldeoxynivalenol (Ac-DON), as well as the macrocyclic secondary metabolite zearalenone on moistened, autoclaved maize, rice and oats. The formation of zearalenone was low, with levels from 15 to 72 mg/kg as compared to the trichothecene production with maximum quantities of 917 mg/kg of AcDON on rice and 750 mg/kg DON on oats. In the cultures of *F. graminearum* 183, total mycotoxin amounts found were lower, with maximum levels of zearalenone up to 150 mg/kg and AcDON up to 160 mg/kg on rice. DON, however, was produced in quantities of about 740 mg/kg on rice. AA





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